

SEQUENCE LISTING

(1) GENERAL INFORMATION:

(I) APPLICANTS: Ken Stokes
Josée Morissette

(ii) TITLE OF INVENTION: SYSTEMS AND METHODS FOR ENHANCING CARDIAC
SIGNAL SENSING BY CARDIAC PACEMAKERS THROUGH GENETIC
TREATMENT

(iii) NUMBER OF SEQUENCES: 12

(iv) CORRESPONDENCE ADDRESS:

(A) ADDRESSEE: Woodcock-Washburn Kurtz Mackiewicz and Norris
(B) STREET: One Liberty Place - 46th Floor
(C) CITY: Philadelphia
(D) STATE: PA
(E) COUNTRY: U.S.A.
(F) ZIP: 19103

(v) COMPUTER READABLE FORM:

(A) MEDIUM TYPE: Floppy disk
(B) COMPUTER: IBM PC compatible
(C) OPERATING SYSTEM: PC-DOS/MS-DOS
(D) SOFTWARE: WordPerfect 6.1

(vi) CURRENT APPLICATION DATA:

(A) APPLICATION NUMBER: N/A
(B) FILING DATE: Herewith
(C) CLASSIFICATION:

(viii) ATTORNEY/AGENT INFORMATION:

(A) NAME: Paul K. Legaard
(B) REGISTRATION NUMBER: 38,534
(C) REFERENCE/DOCKET NUMBER: MEDT-0029/P-3586

(ix) TELECOMMUNICATION INFORMATION:

(A) TELEPHONE: (215) 568-3100
(B) TELEFAX: (215) 568-3439

(2) INFORMATION FOR SEQ ID NO:1:

(I) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 6048 bases
(B) TYPE: nucleic acid
(C) STRANDEDNESS: double
(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:1:

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| ATG | GCA | AAC | TTC | CTA | TTA | CCT | CGG | GGC | ACC | AGC | AGC | TTC | CGC | AGG | 45 |
| Met | Ala | Asn | Phe | Leu | Leu | Pro | Arg | Gly | Thr | Ser | Ser | Phe | Arg | Arg | |
| 1 | | | | 5 | | | | 10 | | | | | 15 | | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| TTC | ACA | CGG | GAG | TCC | CTG | GCA | GCC | ATC | GAG | AAG | CGC | ATG | GCG | GAG | 90 |
| Phe | Thr | Arg | Glu | Ser | Leu | Ala | Ala | Ile | Glu | Lys | Arg | Met | Ala | Glu | |

| 20 | | | | | 25 | | | | | 30 | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| AAG | CAA | GCC | CGC | GGC | TCA | ACC | ACC | TTG | CAG | GAG | AGC | CGA | GAG | GGG | 135 | |
| Lys | Gln | Ala | Arg | Gly | Ser | Thr | Thr | Leu | Gln | Glu | Ser | Arg | Glu | Gly | | |
| 35 | | | | | 40 | | | | | 45 | | | | | | |
| CTG | CCC | GAG | GAG | GAG | GCT | CCC | CGG | CCC | CAG | CTG | GAC | CTG | CAG | GCC | 180 | |
| Leu | Pro | Glu | Glu | Glu | Ala | Pro | Arg | Pro | Gln | Leu | Asp | Leu | Gln | Ala | | |
| 50 | | | | | 55 | | | | | 60 | | | | | | |
| TCC | AAA | AAG | CTG | CCA | GAT | CTC | TAT | GGC | AAT | CCA | CCC | CAA | GAG | CTC | 225 | |
| Ser | Lys | Lys | Leu | Pro | Asp | Leu | Tyr | Gly | Asn | Pro | Pro | Gln | Glu | Leu | | |
| 65 | | | | | 70 | | | | | 75 | | | | | | |
| ATC | GGA | GAG | CCC | CTG | GAG | GAC | CTG | GAC | CCC | TTC | TAT | AGC | ACC | CAA | 270 | |
| Ile | Gly | Glu | Pro | Leu | Glu | Asp | Leu | Asp | Pro | Phe | Tyr | Ser | Thr | Gln | | |
| 80 | | | | | 85 | | | | | 90 | | | | | | |
| AAG | ACT | TTC | ATC | GTA | CTG | AAT | AAA | GGC | AAG | ACC | ATC | TTC | CGG | TTC | 315 | |
| Lys | Thr | Phe | Ile | Val | Leu | Asn | Lys | Gly | Lys | Thr | Ile | Phe | Arg | Phe | | |
| 95 | | | | | 100 | | | | | 105 | | | | | | |
| AGT | GCC | ACC | AAC | GCC | TTG | TAT | GTC | CTC | AGT | CCC | TTC | CAC | CCA | GTT | 360 | |
| Ser | Ala | Thr | Asn | Ala | Leu | Tyr | Val | Leu | Ser | Pro | Phe | His | Pro | Val | | |
| 110 | | | | | 115 | | | | | 120 | | | | | | |
| CGG | AGA | GCG | GCT | GTG | AAG | ATT | CTG | GTT | CAC | TCG | CTC | TTC | AAC | ATG | 405 | |
| Arg | Arg | Ala | Ala | Val | Lys | Ile | Leu | Val | His | Ser | Leu | Phe | Asn | Met | | |
| 125 | | | | | 130 | | | | | 135 | | | | | | |
| CTC | ATC | ATG | TGC | ACC | ATC | CTC | ACC | AAC | TGC | GTG | TTC | ATG | GCC | CAG | 450 | |
| Leu | Ile | Met | Cys | Thr | Ile | Leu | Thr | Asn | Cys | Val | Phe | Met | Ala | Gln | | |
| 140 | | | | | 145 | | | | | 150 | | | | | | |
| CAC | GAC | CCT | CCA | CCC | TGG | ACC | AAG | TAT | GTC | GAG | TAC | ACC | TTC | ACC | 495 | |
| His | Asp | Pro | Pro | Pro | Trp | Thr | Lys | Tyr | Val | Glu | Tyr | Thr | Phe | Thr | | |
| 155 | | | | | 160 | | | | | 165 | | | | | | |
| GCC | ATT | TAC | ACC | TTT | GAG | TCT | CTG | GTC | AAG | ATT | CTG | GCT | CGA | GCT | 540 | |
| Ala | Ile | Tyr | Thr | Phe | Glu | Ser | Leu | Val | Lys | Ile | Leu | Ala | Arg | Ala | | |
| 170 | | | | | 175 | | | | | 180 | | | | | | |
| TTC | TGC | CTG | CAC | GCG | TTC | ACT | TTC | CTT | CGG | GAC | CCA | TGG | AAC | TGG | 585 | |
| Phe | Cys | Leu | His | Ala | Phe | Thr | Phe | Leu | Arg | Asp | Pro | Trp | Asn | Trp | | |
| 185 | | | | | 190 | | | | | 195 | | | | | | |
| CTG | GAC | TTT | AGT | GTG | ATT | ATC | ATG | GCA | TAC | ACA | ACT | GAA | TTT | GTG | 630 | |
| Leu | Asp | Phe | Ser | Val | Ile | Ile | Met | Ala | Tyr | Thr | Thr | Glu | Phe | Val | | |
| 200 | | | | | 205 | | | | | 210 | | | | | | |
| GAC | CTG | GGC | AAT | GTC | TCA | GCC | TTA | CGC | ACC | TTC | CGA | GTC | CTC | CGG | 675 | |
| Asp | Leu | Gly | Asn | Val | Ser | Ala | Leu | Arg | Thr | Phe | Arg | Val | Leu | Arg | | |
| 215 | | | | | 220 | | | | | 225 | | | | | | |
| GCC | CTG | AAA | ACT | ATA | TCA | GTC | ATT | TCA | GGG | CTG | AAG | ACC | ATC | GTG | 720 | |
| Ala | Leu | Lys | Thr | Ile | Ser | Val | Ile | Ser | Gly | Leu | Lys | Thr | Ile | Val | | |

| | | | | 230 | | | | 235 | | | | 240 | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|--|
| GGG | GCC | CTG | ATC | CAG | TCT | GTG | AAG | AAG | CTG | GCT | GAT | GTG | ATG | GTC | 765 | |
| Gly | Ala | Leu | Ile | Gln | Ser | Val | Lys | Lys | Leu | Ala | Asp | Val | Met | Val | | |
| | | | | 245 | | | | | 250 | | | | | 255 | | |
| CTC | ACA | GTC | TTC | TGC | CTC | AGC | GTC | TTT | GCC | CTC | ATC | GGC | CTG | CAG | 810 | |
| Leu | Thr | Val | Phe | Cys | Leu | Ser | Val | Phe | Ala | Leu | Ile | Gly | Leu | Gln | | |
| | | | | 260 | | | | | 265 | | | | | 270 | | |
| CTC | TTC | ATG | GGC | AAC | CTA | AGG | CAC | AAG | TGT | GTG | CGC | AAC | TTC | ACA | 855 | |
| Leu | Phe | Met | Gly | Asn | Leu | Arg | His | Lys | Cys | Val | Arg | Asn | Phe | Thr | | |
| | | | | 275 | | | | | 280 | | | | | 285 | | |
| GCG | CTC | AAC | GGC | ACC | AAC | GGC | TCC | GTG | GAG | GCC | GAC | GGC | TTG | GTC | 900 | |
| Ala | Leu | Asn | Gly | Thr | Asn | Gly | Ser | Val | Glu | Ala | Asp | Gly | Leu | Val | | |
| | | | | 290 | | | | | 295 | | | | | 300 | | |
| TGG | GAA | TCC | CTG | GAC | CTT | TAC | CTC | AGT | GAT | CCA | GAA | AAT | TAC | CTG | 945 | |
| Trp | Glu | Ser | Leu | Asp | Leu | Tyr | Leu | Ser | Asp | Pro | Glu | Asn | Tyr | Leu | | |
| | | | | 305 | | | | | 310 | | | | | 315 | | |
| CTC | AAG | AAC | GGC | ACC | TCT | GAT | GTG | TTA | CTG | TGT | GGG | AAC | AGC | TCT | 990 | |
| Leu | Lys | Asn | Gly | Thr | Ser | Asp | Val | Leu | Leu | Cys | Gly | Asn | Ser | Ser | | |
| | | | | 320 | | | | | 325 | | | | | 330 | | |
| GAC | GCT | GGG | ACA | TGT | CCG | GAG | GGC | TAC | CGG | TGC | CTA | AAG | GCA | GGC | 1035 | |
| Asp | Ala | Gly | Thr | Cys | Pro | Glu | Gly | Tyr | Arg | Cys | Leu | Lys | Ala | Gly | | |
| | | | | 335 | | | | | 340 | | | | | 345 | | |
| GAG | AAC | CCC | GAC | CAC | GGC | TAC | ACC | AGC | TTC | GAT | TCC | TTT | GCC | TGG | 1080 | |
| Glu | Asn | Pro | Asp | His | Gly | Tyr | Thr | Ser | Phe | Asp | Ser | Phe | Ala | Trp | | |
| | | | | 350 | | | | | 355 | | | | | 360 | | |
| GCC | TTT | CTT | GCA | CTC | TTC | CGC | CTG | ATG | ACG | CAG | GAC | TGC | TGG | GAG | 1125 | |
| Ala | Phe | Leu | Ala | Leu | Phe | Arg | Leu | Met | Thr | Gln | Asp | Cys | Trp | Glu | | |
| | | | | 365 | | | | | 370 | | | | | 375 | | |
| CGC | CTC | TAT | CAG | CAG | ACC | CTC | AGG | TCC | GCA | GGG | AAG | ATC | TAC | ATG | 1170 | |
| Arg | Leu | Tyr | Gln | Gln | Thr | Leu | Arg | Ser | Ala | Gly | Lys | Ile | Tyr | Met | | |
| | | | | 380 | | | | | 385 | | | | | 390 | | |
| ATC | TTC | TTC | ATG | CTT | GTC | ATC | TTC | CTG | GGG | TCC | TTC | TAC | CTG | GTG | 1215 | |
| Ile | Phe | Phe | Met | Leu | Val | Ile | Phe | Leu | Gly | Ser | Phe | Tyr | Leu | Val | | |
| | | | | 395 | | | | | 400 | | | | | 405 | | |
| AAC | CTG | ATC | CTG | GCC | GTG | GTC | GCA | ATG | GCC | TAT | GAG | GAG | CAA | AAC | 1260 | |
| Asn | Leu | Ile | Leu | Ala | Val | Val | Ala | Met | Ala | Tyr | Glu | Glu | Gln | Asn | | |
| | | | | 410 | | | | | 415 | | | | | 420 | | |
| CAA | GCC | ACC | ATC | GCT | GAG | ACC | GAG | GAG | AAG | GAA | AAG | CGC | TTC | CAG | 1305 | |
| Gln | Ala | Thr | Ile | Ala | Glu | Thr | Glu | Glu | Lys | Glu | Lys | Arg | Phe | Gln | | |
| | | | | 425 | | | | | 430 | | | | | 435 | | |
| GAG | GCC | ATG | GAA | ATG | CTC | AAG | AAA | GAA | CAC | GAG | GCC | CTC | ACC | ATC | 1350 | |
| Glu | Ala | Met | Glu | Met | Leu | Lys | Lys | Glu | His | Glu | Ala | Leu | Thr | Ile | | |

| 440 | | | | 445 | | | | 450 | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|------|
| AGG | GGT | GTG | GAT | ACC | GTG | TCC | CGT | AGC | TCC | TTG | GAG | ATG | TCC | CCT | | 1395 |
| Arg | Gly | Val | Asp | Thr | Val | Ser | Arg | Ser | Ser | Leu | Glu | Met | Ser | Pro | | |
| 455 | | | | 460 | | | | 465 | | | | | | | | |
| TTG | GCC | CCA | GTA | AAC | AGC | CAT | GAG | AGA | AGA | AGC | AAG | AGG | AGA | AAA | | 1440 |
| Leu | Ala | Pro | Val | Asn | Ser | His | Glu | Arg | Arg | Ser | Lys | Arg | Arg | Lys | | |
| 470 | | | | 475 | | | | 480 | | | | | | | | |
| CGG | ATG | TCT | TCA | GGA | ACT | GAG | GAG | TGT | GGG | GAG | GAC | AGG | CTC | CCC | | 1485 |
| Arg | Met | Ser | Ser | Gly | Thr | Glu | Glu | Cys | Gly | Glu | Asp | Arg | Leu | Pro | | |
| 485 | | | | 490 | | | | 495 | | | | | | | | |
| AAG | TCT | GAC | TCA | GAA | GAT | GGT | CCC | AGA | GCA | ATG | AAT | CAT | CTC | AGC | | 1520 |
| Lys | Ser | Asp | Ser | Glu | Asp | Gly | Pro | Arg | Ala | Met | Asn | His | Leu | Ser | | |
| 500 | | | | 505 | | | | 510 | | | | | | | | |
| CTC | ACC | CGT | GGC | CTC | AGC | AGG | ACT | TCT | ATG | AAG | CCA | CGT | TCC | AGC | | 1565 |
| Leu | Thr | Arg | Gly | Leu | Ser | Arg | Thr | Ser | Met | Lys | Pro | Arg | Ser | Ser | | |
| 515 | | | | 520 | | | | 525 | | | | | | | | |
| CGC | GGG | AGC | ATT | TTC | ACC | TTT | CGC | AGG | CGA | GAC | CTG | GGT | TCT | GAA | | 1620 |
| Arg | Gly | Ser | Ile | Phe | Thr | Phe | Arg | Arg | Arg | Asp | Leu | Gly | Ser | Glu | | |
| 530 | | | | 535 | | | | 540 | | | | | | | | |
| GCA | GAT | TTT | GCA | GAT | GAT | GAA | AAC | AGC | ACA | GCG | CGG | GAG | AGC | GAG | | 1665 |
| Ala | Asp | Phe | Ala | Asp | Asp | Glu | Asn | Ser | Thr | Ala | Arg | Glu | Ser | Glu | | |
| 545 | | | | 550 | | | | 555 | | | | | | | | |
| AGC | CAC | CAC | ACA | TCA | CTG | CTG | GTG | CCC | TGG | CCC | CTG | CGC | CGG | ACC | | 1710 |
| Ser | His | His | Thr | Ser | Leu | Leu | Val | Pro | Trp | Pro | Leu | Arg | Arg | Thr | | |
| 560 | | | | 565 | | | | 570 | | | | | | | | |
| AGT | GCC | CAG | GGA | CAG | CCC | AGT | CCC | GGA | ACC | TCG | GCT | CCT | GGC | CAC | | 1755 |
| Ser | Ala | Gln | Gly | Gln | Pro | Ser | Pro | Gly | Thr | Ser | Ala | Pro | Gly | His | | |
| 575 | | | | 580 | | | | 585 | | | | | | | | |
| GCC | CTC | CAT | GGC | AAA | AAG | AAC | AGC | ACT | GTG | GAC | TGC | AAT | GGG | GTG | | 1800 |
| Ala | Leu | His | Gly | Lys | Lys | Asn | Ser | Thr | Val | Asp | Cys | Asn | Gly | Val | | |
| 590 | | | | 595 | | | | 600 | | | | | | | | |
| GTC | TCA | TTA | CTG | GGG | GCA | GGC | GAC | CCA | GAG | GCC | ACA | TCC | CCA | GGA | | 1845 |
| Val | Ser | Leu | Leu | Gly | Ala | Gly | Asp | Pro | Glu | Ala | Thr | Ser | Pro | Gly | | |
| 605 | | | | 610 | | | | 615 | | | | | | | | |
| AGC | CAC | CTC | CTC | CGC | CCT | GTG | ATG | CTA | GAG | CAC | CCG | CCA | GAC | ACG | | 1890 |
| Ser | His | Leu | Leu | Arg | Pro | Val | Met | Leu | Glu | His | Pro | Pro | Asp | Thr | | |
| 620 | | | | 625 | | | | 630 | | | | | | | | |
| ACC | ACG | CCA | TCG | GAG | GAG | CCA | GGC | GGC | CCC | CAG | ATG | CTG | ACC | TCC | | 1935 |
| Thr | Thr | Pro | Ser | Glu | Glu | Pro | Gly | Gly | Pro | Gln | Met | Leu | Thr | Ser | | |
| 635 | | | | 640 | | | | 645 | | | | | | | | |
| CAG | GCT | CCG | TGT | GTA | GAT | GGC | TTC | GAG | GAG | CCA | GGA | GCA | CGG | CAG | | 1980 |
| Gln | Ala | Pro | Cys | Val | Asp | Gly | Phe | Glu | Glu | Pro | Gly | Ala | Arg | Gln | | |

| | | | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|--|--|--|--|
| | | | | 650 | | | | | 655 | | | | | 660 | | | | | |
| CGG | GCC | CTC | AGC | GCA | GTC | AGC | GTC | CTC | ACA | AGC | GCA | CTG | GAA | GAG | 2025 | | | | |
| Arg | Ala | Leu | Ser | Ala | Val | Ser | Val | Leu | Thr | Ser | Ala | Leu | Glu | Glu | | | | | |
| | | | | 665 | | | | | 670 | | | | | 675 | | | | | |
| TTA | GAG | GAG | TCT | CGC | CAC | AAG | TGT | CCA | CCA | TGC | TGG | AAC | CGT | CTC | 2070 | | | | |
| Leu | Glu | Glu | Ser | Arg | His | Lys | Cys | Pro | Pro | Cys | Trp | Asn | Arg | Leu | | | | | |
| | | | | 680 | | | | | 685 | | | | | 690 | | | | | |
| GCC | CAG | CGC | TAC | CTG | ATC | TGG | GAG | TGC | TGC | CCG | CTG | TGG | ATG | TCC | 2115 | | | | |
| Ala | Gln | Arg | Tyr | Leu | Ile | Trp | Glu | Cys | Cys | Pro | Leu | Trp | Met | Ser | | | | | |
| | | | | 695 | | | | | 700 | | | | | 705 | | | | | |
| ATC | AAG | CAG | GGA | GTG | AAG | TTG | GTG | GTC | ATG | GAC | CCG | TTT | ACT | GAC | 2160 | | | | |
| Ile | Lys | Gln | Gly | Val | Lys | Leu | Val | Val | Met | Asp | Pro | Phe | Thr | Asp | | | | | |
| | | | | 710 | | | | | 715 | | | | | 720 | | | | | |
| CTC | ACC | ATC | ACT | ATG | TGC | ATC | GTA | CTC | AAC | ACA | CTC | TTC | ATG | GCG | 2205 | | | | |
| Leu | Thr | Ile | Thr | Met | Cys | Ile | Val | Leu | Asn | Thr | Leu | Phe | Met | Ala | | | | | |
| | | | | 725 | | | | | 730 | | | | | 735 | | | | | |
| CTG | GAG | CAC | TAC | AAC | ATG | ACA | AGT | GAA | TTC | GAG | GAG | ATG | CTG | CAG | 2250 | | | | |
| Leu | Glu | His | Tyr | Asn | Met | Thr | Ser | Glu | Phe | Glu | Glu | Met | Leu | Gln | | | | | |
| | | | | 740 | | | | | 745 | | | | | 750 | | | | | |
| GTC | GGA | AAC | CTG | GTC | TTC | ACA | GGG | ATT | TTC | ACA | GCA | GAG | ATG | ACC | 2295 | | | | |
| Val | Gly | Asn | Leu | Val | Phe | Thr | Gly | Ile | Phe | Thr | Ala | Glu | Met | Thr | | | | | |
| | | | | 755 | | | | | 760 | | | | | 765 | | | | | |
| TTC | AAG | ATC | ATT | GCC | CTC | GAC | CCC | TAC | TAC | TAC | TTC | CAA | CAG | GGC | 2340 | | | | |
| Phe | Lys | Ile | Ile | Ala | Leu | Asp | Pro | Tyr | Tyr | Tyr | Phe | Gln | Gln | Gly | | | | | |
| | | | | 770 | | | | | 775 | | | | | 780 | | | | | |
| TGG | AAC | ATC | TTC | GAC | AGC | ATC | ATC | GTC | ATC | CTT | AGC | CTC | ATG | GAG | 2385 | | | | |
| Trp | Asn | Ile | Phe | Asp | Ser | Ile | Ile | Val | Ile | Leu | Ser | Leu | Met | Glu | | | | | |
| | | | | 785 | | | | | 790 | | | | | 795 | | | | | |
| CTG | GGC | CTG | TCC | CGC | ATG | AGC | AAC | TTG | TCG | GTG | CTG | CGC | TCC | TTC | 2430 | | | | |
| Leu | Gly | Leu | Ser | Arg | Met | Ser | Asn | Leu | Ser | Val | Leu | Arg | Ser | Phe | | | | | |
| | | | | 800 | | | | | 805 | | | | | 810 | | | | | |
| CGC | CTG | CTG | CGG | GTC | TTC | AAG | CTG | GCC | AAA | TCA | TGG | CCC | ACC | CTG | 2475 | | | | |
| Arg | Leu | Leu | Arg | Val | Phe | Lys | Leu | Ala | Lys | Ser | Trp | Pro | Thr | Leu | | | | | |
| | | | | 815 | | | | | 820 | | | | | 825 | | | | | |
| AAC | ACA | CTC | ATC | AAG | ATC | ATC | GGG | AAC | TCA | GTG | GGG | GCA | CTG | GGG | 2520 | | | | |
| Asn | Thr | Leu | Ile | Lys | Ile | Ile | Gly | Asn | Ser | Val | Gly | Ala | Leu | Gly | | | | | |
| | | | | 830 | | | | | 835 | | | | | 840 | | | | | |
| AAC | CTG | ACA | CTG | GTG | CTA | GCC | ATC | ATC | GTG | TTC | ATC | TTT | GCT | GTG | 2565 | | | | |
| Asn | Leu | Thr | Leu | Val | Leu | Ala | Ile | Ile | Val | Phe | Ile | Phe | Ala | Val | | | | | |
| | | | | 845 | | | | | 850 | | | | | 855 | | | | | |
| GTG | GGC | ATG | CAG | CTC | TTT | GGC | AAG | AAC | TAC | TCG | GAG | CTG | AGG | GAC | 2610 | | | | |
| Val | Gly | Met | Gln | Leu | Phe | Gly | Lys | Asn | Tyr | Ser | Glu | Leu | Arg | Asp | | | | | |

| | | | | 860 | | | | 865 | | | | 870 | | | | |
|-----|-----|-----|-----|------|-----|-----|-----|-----|------|-----|-----|-----|-----|------|------|--|
| AGC | GAC | TCA | GGC | CTG | CTG | CCT | CGC | TGG | CAC | ATG | ATG | GAC | TTC | TTT | 2655 | |
| Ser | Asp | Ser | Gly | Leu | Leu | Pro | Arg | Trp | His | Met | Met | Asp | Phe | Phe | | |
| | | | | 875 | | | | | 880 | | | | | 885 | | |
| CAT | GCC | TTC | CTA | ATC | ATC | TTC | CGC | ATC | CTC | TGT | GGA | GAG | TGG | ATC | 2700 | |
| His | Ala | Phe | Leu | Ile | Ile | Phe | Arg | Ile | Leu | Cys | Gly | Glu | Trp | Ile | | |
| | | | | 890 | | | | | 895 | | | | | 900 | | |
| GAG | ACC | ATG | TGG | GAC | TGC | ATG | GAG | GTG | TCG | GGG | CAG | TCA | TTA | TGC | 2745 | |
| Glu | Thr | Met | Trp | Asp | Cys | Met | Glu | Val | Ser | Gly | Gln | Ser | Leu | Cys | | |
| | | | | 905 | | | | | 910 | | | | | 915 | | |
| CTG | CTG | GTC | TTC | TTG | CTT | GTT | ATG | GTC | ATT | GGC | AAC | CTT | GTG | GTC | 2790 | |
| Leu | Leu | Val | Phe | Leu | Leu | Val | Met | Val | Ile | Gly | Asn | Leu | Val | Val | | |
| | | | | 920 | | | | | 925 | | | | | 930 | | |
| CTG | AAT | CTC | TTC | CTG | GCC | TTG | CTG | CTC | AGC | TCC | TTC | AGT | GCA | GAC | 2835 | |
| Leu | Asn | Leu | Phe | Leu | Ala | Leu | Leu | Leu | Ser | Ser | Phe | Ser | Ala | Asp | | |
| | | | | 935 | | | | | 940 | | | | | 945 | | |
| AAC | CTC | ACA | GCC | CCT | GAT | GAG | GAC | AGA | GAG | ATG | AAC | AAC | CTC | CAG | 2880 | |
| Asn | Leu | Thr | Ala | Pro | Asp | Glu | Asp | Arg | Glu | Met | Asn | Asn | Leu | Gln | | |
| | | | | 950 | | | | | 955 | | | | | 960 | | |
| CTG | GCC | CTG | GCC | CGC | ATC | CAG | AGG | GGC | CTG | CGC | TTT | GTC | AAG | CGG | 2925 | |
| Leu | Ala | Leu | Ala | Arg | Ile | Gln | Arg | Gly | Leu | Arg | Phe | Val | Lys | Arg | | |
| | | | | 965 | | | | | 970 | | | | | 975 | | |
| ACC | ACC | TGG | GAT | TTC | TGC | TGT | GGT | CTC | CTG | CGG | CAC | CGG | CCT | CAG | 2970 | |
| Thr | Thr | Trp | Asp | Phe | Cys | Cys | Gly | Leu | Leu | Arg | His | Arg | Pro | Gln | | |
| | | | | 980 | | | | | 985 | | | | | 990 | | |
| AAG | CCC | GCA | GCC | CTT | GCC | GCC | CAG | GGC | CAG | CTG | CCC | AGC | TGC | ATT | 3015 | |
| Lys | Pro | Ala | Ala | Leu | Ala | Ala | Gln | Gly | Gln | Leu | Pro | Ser | Cys | Ile | | |
| | | | | 995 | | | | | 1000 | | | | | 1005 | | |
| GCC | ACC | CCC | TAC | TCC | CCG | CCA | CCC | CCA | GAG | ACG | GAG | AAG | GTG | CCT | 3060 | |
| Ala | Thr | Pro | Tyr | Ser | Pro | Pro | Pro | Pro | Glu | Thr | Glu | Lys | Val | Pro | | |
| | | | | 1010 | | | | | 1015 | | | | | 1020 | | |
| CCC | ACC | CGC | AAG | GAA | ACA | CAG | TTT | GAG | GAA | GGC | GAG | CAA | CCA | GGC | 3105 | |
| Pro | Thr | Arg | Lys | Glu | Thr | Gln | Phe | Glu | Glu | Gly | Glu | Gln | Pro | Gly | | |
| | | | | 1025 | | | | | 1030 | | | | | 1035 | | |
| CAG | GGC | ACC | CCC | GGG | GAT | CCA | GAC | GCC | GTG | TGT | GTG | CCC | ATC | GCT | 3150 | |
| Gln | Gly | Thr | Pro | Gly | Asp | Pro | Glu | Pro | Val | Cys | Val | Pro | Ile | Ala | | |
| | | | | 1040 | | | | | 1045 | | | | | 1050 | | |
| GTG | GCC | GAG | TCA | GAC | ACA | GAT | GAC | CAA | GAA | GAG | GAT | GAG | GAG | AAC | 3195 | |
| Val | Ala | Glu | Ser | Asp | Thr | Asp | Asp | Gln | Glu | Glu | Asp | Glu | Glu | Asn | | |
| | | | | 1055 | | | | | 1060 | | | | | 1065 | | |
| AGC | CTG | GGC | ACG | GAG | GAG | GAG | TCC | AGC | AAG | CAG | CAG | GAA | TCC | CAG | 3240 | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|------|-----|-----|-----|-----|------|-----|-----|-----|-----|------|------|
| Ser | Leu | Gly | Thr | Glu | Glu | Glu | Ser | Ser | Lys | Gln | Gln | Glu | Ser | Gln | |
| | | | | 1070 | | | | | 1075 | | | | | 1080 | |
| CCT | GTG | TCC | GGC | TGG | CCC | AGA | GGC | CCT | CCG | GAT | TCC | AGG | ACC | TGG | 3285 |
| Pro | Val | Ser | Gly | Trp | Pro | Arg | Gly | Pro | Pro | Asp | Ser | Arg | Thr | Trp | |
| | | | | 1085 | | | | | 1090 | | | | | 1095 | |
| AGC | CAG | GTG | TCA | GCG | ACT | GCC | TCC | TCT | GAG | GCC | GAG | GCC | AGT | GCA | 3330 |
| Ser | Gln | Val | Ser | Ala | Thr | Ala | Ser | Ser | Glu | Ala | Glu | Ala | Ser | Ala | |
| | | | | 1100 | | | | | 1105 | | | | | 1110 | |
| TCT | CAG | GCC | GAC | TGG | CGG | CAG | CAG | TGG | AAA | GCG | GAA | CCC | CAG | GCC | 3375 |
| Ser | Gln | Ala | Asp | Trp | Arg | Gln | Gln | Trp | Lys | Ala | Glu | Pro | Gln | Ala | |
| | | | | 1115 | | | | | 1120 | | | | | 1125 | |
| CCA | GGG | TGC | GGT | GAG | ACC | CCA | GAG | GAC | AGT | TGC | TCC | GAG | GGC | AGC | 3420 |
| Pro | Gly | Cys | Gly | Glu | Thr | Pro | Glu | Asp | Ser | Cys | Ser | Glu | Gly | Ser | |
| | | | | 1130 | | | | | 1135 | | | | | 1140 | |
| ACA | GCA | GAC | ATG | ACC | AAC | ACC | GCT | GAG | CTC | CTG | GAG | CAG | ATC | CCT | 3465 |
| Thr | Ala | Asp | Met | Thr | Asn | Thr | Ala | Glu | Leu | Leu | Glu | Gln | Ile | Pro | |
| | | | | 1145 | | | | | 1150 | | | | | 1155 | |
| GAC | CTC | GGC | CAG | GAT | GTC | AAG | GAC | CCA | GAG | GAC | TGC | TTC | ACT | GAA | 3510 |
| Asp | Leu | Gly | Gln | Asp | Val | Lys | Asp | Pro | Glu | Asp | Cys | Phe | Thr | Glu | |
| | | | | 1160 | | | | | 1165 | | | | | 1170 | |
| GGC | TGT | GTC | CGG | CGC | TGT | CCC | TGC | TGT | GCG | GTG | GAC | ACC | ACA | CAG | 3555 |
| Gly | Cys | Val | Arg | Arg | Cys | Pro | Cys | Cys | Ala | Val | Asp | Thr | Thr | Gln | |
| | | | | 1175 | | | | | 1180 | | | | | 1185 | |
| GCC | CCA | GGG | AAG | GTC | TGG | TGG | CGG | TTG | CGC | AAG | ACC | TGC | TAC | CAC | 3600 |
| Ala | Pro | Gly | Lys | Val | Trp | Trp | Arg | Leu | Arg | Lys | Thr | Cys | Tyr | His | |
| | | | | 1190 | | | | | 1195 | | | | | 1200 | |
| ATC | GTG | GAG | CAC | AGC | TGG | TTC | GAG | ACA | TTC | ATC | ATC | TTC | ATG | ATC | 3645 |
| Ile | Val | Glu | His | Ser | Trp | Phe | Glu | Thr | Phe | Ile | Ile | Phe | Met | Ile | |
| | | | | 1205 | | | | | 1210 | | | | | 1215 | |
| CTA | CTC | AGC | AGT | GGA | GCG | CTG | GCC | TTC | GAG | GAC | ATC | TAC | CTA | GAG | 3690 |
| Leu | Leu | Ser | Ser | Gly | Ala | Leu | Ala | Phe | Glu | Asp | Ile | Tyr | Leu | Glu | |
| | | | | 1220 | | | | | 1225 | | | | | 1230 | |
| GAG | CGG | AAG | ACC | ATC | AAG | GTT | CTG | CTT | GAG | TAT | GCC | GAC | AAG | ATG | 3735 |
| Glu | Arg | Lys | Thr | Ile | Lys | Val | Leu | Leu | Glu | Tyr | Ala | Asp | Lys | Met | |
| | | | | 1235 | | | | | 1240 | | | | | 1245 | |
| TTC | ACA | TAT | GTC | TTC | GTG | CTG | GAG | ATG | CTG | CTC | AAG | TGG | GTG | GCC | 3780 |
| Phe | Thr | Tyr | Val | Phe | Val | Leu | Glu | Met | Leu | Leu | Lys | Trp | Val | Ala | |
| | | | | 1250 | | | | | 1255 | | | | | 1260 | |
| TAC | GGC | TTC | AAG | AAG | TAC | TTC | ACC | AAT | GCC | TGG | TGC | TGG | CTC | GAC | 3825 |
| Tyr | Gly | Phe | Lys | Lys | Tyr | Phe | Thr | Asn | Ala | Trp | Cys | Trp | Leu | Asp | |
| | | | | 1265 | | | | | 1270 | | | | | 1275 | |
| TTC | CTC | ATC | GTA | GAC | GTC | TCT | CTG | GTC | AGC | CTG | GTG | GCC | AAC | ACC | 3870 |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|------|-----|-----|-----|-----|------|-----|-----|-----|-----|------|------|
| Phe | Leu | Ile | Val | Asp | Val | Ser | Leu | Val | Ser | Leu | Val | Ala | Asn | Thr | |
| | | | | 1280 | | | | | 1285 | | | | | 1290 | |
| CTG | GGC | TTT | GCC | GAG | ATG | GGC | CCC | ATC | AAG | TCA | CTG | CGG | ACG | CTG | 3915 |
| Leu | Gly | Phe | Ala | Glu | Met | Gly | Pro | Ile | Lys | Ser | Leu | Arg | Thr | Leu | |
| | | | | 1295 | | | | | 1300 | | | | | 1305 | |
| CGT | GCA | CTC | CGT | CCT | CTG | AGA | GCT | CTG | TCA | CGA | TTT | GAG | GGC | ATG | 3960 |
| Arg | Ala | Leu | Arg | Pro | Leu | Arg | Ala | Leu | Ser | Arg | Phe | Glu | Gly | Met | |
| | | | | 1310 | | | | | 1315 | | | | | 1320 | |
| AGG | GTG | GTG | GTC | AAT | GCC | CTG | GTG | GGC | GCC | ATC | CCG | TCC | ATC | ATG | 4005 |
| Arg | Val | Val | Val | Asn | Ala | Leu | Val | Gly | Ala | Ile | Pro | Ser | Ile | Met | |
| | | | | 1325 | | | | | 1330 | | | | | 1335 | |
| AAC | GTC | CTC | CTC | GTC | TGC | CTC | ATC | TTC | TGG | CTC | ATC | TTC | AGC | ATC | 4050 |
| Asn | Val | Leu | Leu | Val | Cys | Leu | Ile | Phe | Trp | Leu | Ile | Phe | Ser | Ile | |
| | | | | 1340 | | | | | 1345 | | | | | 1350 | |
| ATG | GGC | GTG | AAC | CTC | TTT | GCG | GGG | AAG | TTT | GGG | AGG | TGC | ATC | AAC | 4095 |
| Met | Gly | Val | Asn | Leu | Phe | Ala | Gly | Lys | Phe | Gly | Arg | Cys | Ile | Asn | |
| | | | | 1355 | | | | | 1360 | | | | | 1365 | |
| CAG | ACA | GAG | GGA | GAC | TTG | CCT | TTG | AAC | TAC | ACC | ATC | GTG | AAC | AAC | 4140 |
| Gln | Thr | Glu | Gly | Asp | Leu | Pro | Leu | Asn | Tyr | Thr | Ile | Val | Asn | Asn | |
| | | | | 1370 | | | | | 1375 | | | | | 1380 | |
| AAG | AGC | CAG | TGT | GAG | TCC | TTG | AAC | TTG | ACC | GGA | GAA | TTG | TAC | TGG | 4185 |
| Lys | Ser | Gln | Cys | Glu | Ser | Leu | Asn | Leu | Thr | Gly | Glu | Leu | Tyr | Trp | |
| | | | | 1385 | | | | | 1390 | | | | | 1395 | |
| ACC | AAG | GTG | AAA | GTC | AAC | TTT | GAC | AAC | GTG | GGG | GCC | GGG | TAC | CTG | 4230 |
| Thr | Lys | Val | Lys | Val | Asn | Phe | Asp | Asn | Val | Gly | Ala | Gly | Tyr | Leu | |
| | | | | 1400 | | | | | 1405 | | | | | 1410 | |
| GCC | CTT | CTG | CAG | GTG | GCA | ACA | TTT | AAA | GGC | TGG | ATG | GAC | ATT | ATG | 4275 |
| Ala | Leu | Leu | Gln | Val | Ala | Thr | Phe | Lys | Gly | Trp | Met | Asp | Ile | Met | |
| | | | | 1415 | | | | | 1420 | | | | | 1425 | |
| TAT | GCA | GCT | GTG | GAC | TCC | AGG | GGG | TAT | GAA | GAG | CAG | CCT | CAG | TGG | 4320 |
| Tyr | Ala | Ala | Val | Asp | Ser | Arg | Gly | Tyr | Glu | Glu | Gln | Pro | Gln | Trp | |
| | | | | 1430 | | | | | 1435 | | | | | 1440 | |
| GAA | TAC | AAC | CTC | TAC | ATG | TAC | ATC | TAT | TTT | GTC | ATT | TTC | ATC | ATC | 4365 |
| Glu | Tyr | Asn | Leu | Tyr | Met | Tyr | Ile | Tyr | Phe | Val | Ile | Phe | Ile | Ile | |
| | | | | 1445 | | | | | 1450 | | | | | 1455 | |
| TTT | GGG | TCT | TTC | TTC | ACC | CTG | AAC | CTC | TTT | ATT | GGT | GTC | ATC | ATT | 4410 |
| Phe | Gly | Ser | Phe | Phe | Thr | Leu | Asn | Leu | Phe | Ile | Gly | Val | Ile | Ile | |
| | | | | 1460 | | | | | 1465 | | | | | 1470 | |
| GAC | AAC | TTC | AAC | CAA | CAG | AAG | AAA | AAG | TTA | GGG | GGC | CAG | GAC | ATC | 4455 |
| Asp | Asn | Phe | Asn | Gln | Gln | Lys | Lys | Lys | Leu | Gly | Gly | Gln | Asp | Ile | |
| | | | | 1475 | | | | | 1480 | | | | | 1485 | |
| TTC | ATG | ACA | GAG | GAG | CAG | AAG | AAG | TAC | TAC | AAT | GCC | ATG | AAG | AAG | 4500 |

| | | | |
|-----------------|---------------------|-------------------------|------|
| Phe Met Thr Glu | Glu Gln Lys Lys Tyr | Tyr Asn Ala Met Lys Lys | |
| | 1490 | 1495 | 1500 |
| CTG GGC TCC AAG | AAG CCC CAG AAG CCC | ATC CCA CGG CCC CTG AAC | 4545 |
| Leu Gly Ser Lys | Lys Pro Gln Lys Pro | Ile Pro Arg Pro Leu Asn | |
| | 1505 | 1510 | 1515 |
| AAG TAC CAG GGC | TTC ATA TTC GAC ATT | GTG ACC AAG CAG GCC TTT | 4590 |
| Lys Tyr Gln Gly | Phe Ile Phe Asp Ile | Val Thr Lys Gln Ala Phe | |
| | 1520 | 1525 | 1530 |
| GAC GTC ACC ATC | ATG TTT CTG ATC TGC | TTG AAT ATG GTG ACC ATG | 4635 |
| Asp Val Thr Ile | Met Phe Leu Ile Cys | Leu Asn Met Val Thr Met | |
| | 1535 | 1540 | 1545 |
| ATG GTG GAG ACA | GAT GAC CAA AGT CCT | GAG AAA ATC AAC ATC TTG | 4680 |
| Met Val Glu Thr | Asp Asp Gln Ser Pro | Glu Lys Ile Asn Ile Leu | |
| | 1550 | 1555 | 1560 |
| GCC AAG ATC AAC | CTG CTC TTT GTG GCC | ATC TTC ACA GGC GAG TGT | 4725 |
| Ala Lys Ile Asn | Leu Leu Phe Val Ala | Ile Phe Thr Gly Glu Cys | |
| | 1565 | 1570 | 1575 |
| ATT GTC AAG CTG | GCT GCC CTG CGC CAC | TAC TAC TTC ACC AAC AGC | 4770 |
| Ile Val Lys Leu | Ala Ala Leu Arg His | Tyr Tyr Phe Thr Asn Ser | |
| | 1580 | 1585 | 1590 |
| TGG AAT ATC TTC | GAC TTC GTG GTT GTC | ATC CTC TCC ATC GTG GGC | 4815 |
| Trp Asn Ile Phe | Asp Phe Val Val Val | Ile Leu Ser Ile Val Gly | |
| | 1595 | 1600 | 1605 |
| ACT GTG CTC TCG | GAC ATC ATC CAG AAG | TAC TTC TTC TCC CCG ACG | 4860 |
| Thr Val Leu Ser | Asp Ile Ile Gln Lys | Tyr Phe Phe Ser Pro Thr | |
| | 1610 | 1615 | 1620 |
| CTC TTC CGA GTC | ATC CGC CTG GCC CGA | ATA GGC CGC ATC CTC AGA | 4905 |
| Leu Phe Arg Val | Ile Arg Leu Ala Arg | Ile Gly Arg Ile Leu Arg | |
| | 1625 | 1630 | 1635 |
| CTG ATC CGA GGG | GCC AAG GGG ATC CGC | ACG CTG CTC TTT GCC CTC | 4950 |
| Leu Ile Arg Gly | Ala Lys Gly Ile Arg | Thr Leu Leu Phe Ala Leu | |
| | 1640 | 1645 | 1650 |
| ATG ATG TCC CTG | CCT GCC CTC TTC AAC | ATC GGG CTG CTG CTC TTC | 4995 |
| Met Met Ser Leu | Pro Ala Leu Phe Asn | Ile Gly Leu Leu Leu Phe | |
| | 1655 | 1660 | 1665 |
| CTC GTC ATG TTC | ATC TAC TCC ATC TTT | GGC ATG GCC AAC TTC GCT | 5040 |
| Leu Val Met Phe | Ile Tyr Ser Ile Phe | Gly Met Ala Asn Phe Ala | |
| | 1670 | 1675 | 1680 |
| TAT GTC AAG TGG | GAG GCT GGC ATC GAC | GAC ATG TTC AAC TTC CAG | 5085 |
| Tyr Val Lys Trp | Glu Ala Gly Ile Asp | Asp Met Phe Asn Phe Gln | |
| | 1685 | 1690 | 1695 |
| ACC TTC GCC AAC | AGC ATG CTG TGC CTC | TTC CAG ATC ACC ACG TCG | 5130 |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|------|-----|-----|-----|-----|------|-----|-----|-----|-----|------|------|--|
| Thr | Phe | Ala | Asn | Ser | Met | Leu | Cys | Leu | Phe | Gln | Ile | Thr | Thr | Ser | | |
| | | | | 1700 | | | | | 1705 | | | | | 1710 | | |
| GCC | GGC | TGG | GAT | GGC | CTC | CTC | AGC | CCC | ATC | CTC | AAC | ACT | GGG | CCG | 5175 | |
| Ala | Gly | Trp | Asp | Gly | Leu | Leu | Ser | Pro | Ile | Leu | Asn | Thr | Gly | Pro | | |
| | | | | 1715 | | | | | 1720 | | | | | 1725 | | |
| CCC | TAC | TGC | GAC | CCC | ACT | CTG | CCC | AAC | AGC | AAT | GGC | TCT | CGG | GGG | 5220 | |
| Pro | Tyr | Cys | Asp | Pro | Thr | Leu | Pro | Asn | Ser | Asn | Gly | Ser | Arg | Gly | | |
| | | | | 1730 | | | | | 1735 | | | | | 1740 | | |
| GAC | TGC | GGG | AGC | CCA | GCC | GTG | GGC | ATC | CTC | TTC | TTC | ACC | ACC | TAC | 5265 | |
| Asp | Cys | Gly | Ser | Pro | Ala | Val | Gly | Ile | Leu | Phe | Phe | Thr | Thr | Tyr | | |
| | | | | 1745 | | | | | 1750 | | | | | 1755 | | |
| ATC | ATC | ATC | TCC | TTC | CTC | ATC | GTG | GTC | AAC | ATG | TAC | ATT | GCC | ATC | 5310 | |
| Ile | Ile | Ile | Ser | Phe | Leu | Ile | Val | Val | Asn | Met | Tyr | Ile | Ala | Ile | | |
| | | | | 1760 | | | | | 1765 | | | | | 1770 | | |
| ATC | CTG | GAG | AAC | TTC | AGC | GTG | GCC | ACG | GAG | GAG | AGC | ACC | GAG | CCC | 5355 | |
| Ile | Leu | Glu | Asn | Phe | Ser | Val | Ala | Thr | Glu | Glu | Ser | Thr | Glu | Pro | | |
| | | | | 1775 | | | | | 1780 | | | | | 1785 | | |
| CTG | AGT | GAG | GAC | GAC | TTC | GAT | ATG | TTC | TAT | GAG | ATC | TGG | GAG | AAA | 5400 | |
| Leu | Ser | Glu | Asp | Asp | Phe | Asp | Met | Phe | Tyr | Glu | Ile | Trp | Glu | Lys | | |
| | | | | 1790 | | | | | 1795 | | | | | 1800 | | |
| TTT | GAC | CCA | GAG | GCC | ACT | CAG | TTT | ATT | GAG | TAT | TCG | GTC | CTG | TCT | 5445 | |
| Phe | Asp | Pro | Glu | Ala | Thr | Gln | Phe | Ile | Glu | Tyr | Ser | Val | Leu | Ser | | |
| | | | | 1805 | | | | | 1810 | | | | | 1815 | | |
| GAC | TTT | GCC | GAC | GCC | CTG | TCT | GAG | CCA | CTC | CGT | ATC | GCC | AAG | CCC | 5490 | |
| Asp | Phe | Ala | Asp | Ala | Leu | Ser | Glu | Pro | Leu | Ile | Arg | Ala | Lys | Pro | | |
| | | | | 1820 | | | | | 1825 | | | | | 1830 | | |
| AAC | CAG | ATA | AGC | CTC | ATC | AAC | ATG | GAC | CTG | CCC | ATG | GTG | AGT | GGG | 5535 | |
| Asn | Gln | Ile | Ser | Leu | Ile | Asn | Met | Asp | Leu | Pro | Met | Val | Ser | Gly | | |
| | | | | 1835 | | | | | 1840 | | | | | 1845 | | |
| GAC | CGC | ATC | CAT | TGC | ATG | GAC | ATT | CTC | TTT | GCC | TTC | ACC | AAA | AGG | 5580 | |
| Asp | Arg | Ile | His | Cys | Met | Asp | Ile | Leu | Phe | Ala | Phe | Thr | Lys | Arg | | |
| | | | | 1850 | | | | | 1855 | | | | | 1860 | | |
| GTC | CTG | GGG | GAG | TCT | GGG | GAG | ATG | GAC | GCC | CTG | AAG | ATC | CAG | ATG | 5625 | |
| Val | Leu | Gly | Glu | Ser | Gly | Glu | Met | Asp | Ala | Leu | Lys | Ile | Gln | Met | | |
| | | | | 1865 | | | | | 1870 | | | | | 1875 | | |
| GAG | GAG | AAG | TTC | ATG | GCA | GCC | AAC | CCA | TCC | AAG | ATC | TCC | TAC | GAG | 5670 | |
| Glu | Glu | Lys | Phe | Met | Ala | Ala | Asn | Pro | Ser | Lys | Ile | Ser | Tyr | Glu | | |
| | | | | 1880 | | | | | 1885 | | | | | 1890 | | |
| CCC | ATC | ACC | ACC | ACA | CTC | CGG | CGC | AAG | CAC | GAA | GAG | GTG | TCG | GCC | 5715 | |
| Pro | Ile | Thr | Thr | Thr | Leu | Arg | Arg | Lys | His | Glu | Glu | Val | Ser | Ala | | |
| | | | | 1895 | | | | | 1900 | | | | | 1905 | | |
| ATG | GTT | ATC | CAG | AGA | GCC | TTC | CGC | AGG | CAC | CTG | CTG | CAA | CGC | TCT | 5760 | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|------|-----|-----|-----|-----|------|-----|-----|-----|-----|------|------|--|
| Met | Val | Ile | Gln | Arg | Ala | Phe | Arg | Arg | His | Leu | Leu | Gln | Arg | Ser | | |
| | | | | 1910 | | | | | 1915 | | | | | 1920 | | |
| TTG | AAG | CAT | GCC | TCC | TTC | CTC | TTC | CGT | CAG | CAG | GCG | GGC | AGC | GGC | 5805 | |
| Leu | Lys | His | Ala | Ser | Phe | Leu | Phe | Arg | Gln | Gln | Ala | Gly | Ser | Gly | | |
| | | | | 1925 | | | | | 1930 | | | | | 1935 | | |
| CTC | TCC | GAA | GAG | GAT | GCC | CCT | GAG | CGA | GAG | GGC | CTC | ATC | GCC | TAC | 5850 | |
| Leu | Ser | Glu | Glu | Asp | Ala | Pro | Glu | Arg | Glu | Gly | Leu | Ile | Ala | Tyr | | |
| | | | | 1940 | | | | | 1945 | | | | | 1950 | | |
| GTG | ATG | AGT | GAG | AAC | TTC | TCC | CGA | CCC | CTT | GGC | CCA | CCC | TCC | AGC | 5895 | |
| Val | Met | Ser | Glu | Asn | Phe | Ser | Arg | Pro | Leu | Gly | Pro | Pro | Ser | Ser | | |
| | | | | 1955 | | | | | 1960 | | | | | 1965 | | |
| TCC | TCC | ATC | TCC | TCC | ACT | TCC | TTC | CCA | CCC | TCC | TAT | GAC | AGT | GTC | 5940 | |
| Ser | Ser | Ile | Ser | Ser | Thr | Ser | Phe | Pro | Pro | Ser | Tyr | Asp | Ser | Val | | |
| | | | | 1970 | | | | | 1975 | | | | | 1980 | | |
| ACT | AGA | GCC | ACC | AGC | GAT | AAC | CTC | CAG | GTG | CGG | GGG | TCT | GAC | TAC | 5985 | |
| Thr | Arg | Ala | Thr | Ser | Asp | Asn | Leu | Gln | Val | Arg | Gly | Ser | Asp | Tyr | | |
| | | | | 1985 | | | | | 1990 | | | | | 1995 | | |
| AGC | CAC | AGT | GAA | GAT | CTC | GCC | GAC | TTC | CCC | CCT | TCT | CCG | GAC | AGG | 6030 | |
| Ser | His | Ser | Glu | Asp | Leu | Ala | Asp | Phe | Pro | Pro | Ser | Pro | Asp | Arg | | |
| | | | | 2000 | | | | | 2005 | | | | | 2010 | | |
| GAC | CGT | GAG | TCC | ATC | GTG | | | | | | | | | | 6048 | |
| Asp | Arg | Glu | Ser | Ile | Val | | | | | | | | | | | |
| | | | | 2015 | | | | | | | | | | | | |

(2) INFORMATION FOR SEQ ID NO:2:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 2016 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: unknown

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:2:

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|
| Met | Ala | Asn | Phe | Leu | Leu | Pro | Arg | Gly | Thr | Ser | Ser | Phe | Arg | Arg | | |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | | |
| Phe | Thr | Arg | Glu | Ser | Leu | Ala | Ala | Ile | Glu | Lys | Arg | Met | Ala | Glu | | |
| | | | | 20 | | | | | 25 | | | | | 30 | | |
| Lys | Gln | Ala | Arg | Gly | Ser | Thr | Thr | Leu | Gln | Glu | Ser | Arg | Glu | Gly | | |
| | | | | 35 | | | | | 40 | | | | | 45 | | |
| Leu | Pro | Glu | Glu | Glu | Ala | Pro | Arg | Pro | Gln | Leu | Asp | Leu | Gln | Ala | | |
| | | | | 50 | | | | | 55 | | | | | 60 | | |
| Ser | Lys | Lys | Leu | Pro | Asp | Leu | Tyr | Gly | Asn | Pro | Pro | Gln | Glu | Leu | | |
| | | | | 65 | | | | | 70 | | | | | 75 | | |
| Ile | Gly | Glu | Pro | Leu | Glu | Asp | Leu | Asp | Pro | Phe | Tyr | Ser | Thr | Gln | | |

| | | | | | 80 | | | | | | 85 | | | | | | 90 |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|----|
| Lys | Thr | Phe | Ile | Val | Leu | Asn | Lys | Gly | Lys | Thr | Ile | Phe | Arg | Phe | | | |
| | | | | 95 | | | | | 100 | | | | | 105 | | | |
| Ser | Ala | Thr | Asn | Ala | Leu | Tyr | Val | Leu | Ser | Pro | Phe | His | Pro | Val | | | |
| | | | | 110 | | | | | 115 | | | | | 120 | | | |
| Arg | Arg | Ala | Ala | Val | Lys | Ile | Leu | Val | His | Ser | Leu | Phe | Asn | Met | | | |
| | | | | 125 | | | | | 130 | | | | | 135 | | | |
| Leu | Ile | Met | Cys | Thr | Ile | Leu | Thr | Asn | Cys | Val | Phe | Met | Ala | Gln | | | |
| | | | | 140 | | | | | 145 | | | | | 150 | | | |
| His | Asp | Pro | Pro | Pro | Trp | Thr | Lys | Tyr | Val | Glu | Tyr | Thr | Phe | Thr | | | |
| | | | | 155 | | | | | 160 | | | | | 165 | | | |
| Ala | Ile | Tyr | Thr | Phe | Glu | Ser | Leu | Val | Lys | Ile | Leu | Ala | Arg | Ala | | | |
| | | | | 170 | | | | | 175 | | | | | 180 | | | |
| Phe | Cys | Leu | His | Ala | Phe | Thr | Phe | Leu | Arg | Asp | Pro | Trp | Asn | Trp | | | |
| | | | | 185 | | | | | 190 | | | | | 195 | | | |
| Leu | Asp | Phe | Ser | Val | Ile | Ile | Met | Ala | Tyr | Thr | Thr | Glu | Phe | Val | | | |
| | | | | 200 | | | | | 205 | | | | | 210 | | | |
| Asp | Leu | Gly | Asn | Val | Ser | Ala | Leu | Arg | Thr | Phe | Arg | Val | Leu | Arg | | | |
| | | | | 215 | | | | | 220 | | | | | 225 | | | |
| Ala | Leu | Lys | Thr | Ile | Ser | Val | Ile | Ser | Gly | Leu | Lys | Thr | Ile | Val | | | |
| | | | | 230 | | | | | 235 | | | | | 240 | | | |
| Gly | Ala | Leu | Ile | Gln | Ser | Val | Lys | Lys | Leu | Ala | Asp | Val | Met | Val | | | |
| | | | | 245 | | | | | 250 | | | | | 255 | | | |
| Leu | Thr | Val | Phe | Cys | Leu | Ser | Val | Phe | Ala | Leu | Ile | Gly | Leu | Gln | | | |
| | | | | 260 | | | | | 265 | | | | | 270 | | | |
| Leu | Phe | Met | Gly | Asn | Leu | Arg | His | Lys | Cys | Val | Arg | Asn | Phe | Thr | | | |
| | | | | 275 | | | | | 280 | | | | | 285 | | | |
| Ala | Leu | Asn | Gly | Thr | Asn | Gly | Ser | Val | Glu | Ala | Asp | Gly | Leu | Val | | | |
| | | | | 290 | | | | | 295 | | | | | 300 | | | |
| Trp | Glu | Ser | Leu | Asp | Leu | Tyr | Leu | Ser | Asp | Pro | Glu | Asn | Tyr | Leu | | | |
| | | | | 305 | | | | | 310 | | | | | 315 | | | |
| Leu | Lys | Asn | Gly | Thr | Ser | Asp | Val | Leu | Leu | Cys | Gly | Asn | Ser | Ser | | | |
| | | | | 320 | | | | | 325 | | | | | 330 | | | |
| Asp | Ala | Gly | Thr | Cys | Pro | Glu | Gly | Tyr | Arg | Cys | Leu | Lys | Ala | Gly | | | |
| | | | | 335 | | | | | 340 | | | | | 345 | | | |
| Glu | Asn | Pro | Asp | His | Gly | Tyr | Thr | Ser | Phe | Asp | Ser | Phe | Ala | Trp | | | |
| | | | | 350 | | | | | 355 | | | | | 360 | | | |

| | | | | |
|-----------------|---|-----|-----|-----|
| Ala Phe Leu Ala | Leu Phe Arg Leu Met Thr Gln Asp Cys Trp Glu | 365 | 370 | 375 |
| Arg Leu Tyr Gln | Gln Thr Leu Arg Ser Ala Gly Lys Ile Tyr Met | 380 | 385 | 390 |
| Ile Phe Phe Met | Leu Val Ile Phe Leu Gly Ser Phe Tyr Leu Val | 395 | 400 | 405 |
| Asn Leu Ile Leu | Ala Val Val Ala Met Ala Tyr Glu Glu Gln Asn | 410 | 415 | 420 |
| Gln Ala Thr Ile | Ala Glu Thr Glu Glu Lys Glu Lys Arg Phe Gln | 425 | 430 | 435 |
| Glu Ala Met Glu | Met Leu Lys Lys Glu His Glu Ala Leu Thr Ile | 440 | 445 | 450 |
| Arg Gly Val Asp | Thr Val Ser Arg Ser Ser Leu Glu Met Ser Pro | 455 | 460 | 465 |
| Leu Ala Pro Val | Asn Ser His Glu Arg Arg Ser Lys Arg Arg Lys | 470 | 475 | 480 |
| Arg Met Ser Ser | Gly Thr Glu Glu Cys Gly Glu Asp Arg Leu Pro | 485 | 490 | 495 |
| Lys Ser Asp Ser | Glu Asp Gly Pro Arg Ala Met Asn His Leu Ser | 500 | 505 | 510 |
| Leu Thr Arg Gly | Leu Ser Arg Thr Ser Met Lys Pro Arg Ser Ser | 515 | 520 | 525 |
| Arg Gly Ser Ile | Phe Thr Phe Arg Arg Arg Asp Leu Gly Ser Glu | 530 | 535 | 540 |
| Ala Asp Phe Ala | Asp Asp Glu Asn Ser Thr Ala Arg Glu Ser Glu | 545 | 550 | 555 |
| Ser His His Thr | Ser Leu Leu Val Pro Trp Pro Leu Arg Arg Thr | 560 | 565 | 570 |
| Ser Ala Gln Gly | Gln Pro Ser Pro Gly Thr Ser Ala Pro Gly His | 575 | 580 | 585 |
| Ala Leu His Gly | Lys Lys Asn Ser Thr Val Asp Cys Asn Gly Val | 590 | 595 | 600 |
| Val Ser Leu Leu | Gly Ala Gly Asp Pro Glu Ala Thr Ser Pro Gly | 605 | 610 | 615 |
| Ser His Leu Leu | Arg Pro Val Met Leu Glu His Pro Pro Asp Thr | 620 | 625 | 630 |

| | | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|--|
| Thr | Thr | Pro | Ser | Glu | Glu | Pro | Gly | Gly | Pro | Gln | Met | Leu | Thr | Ser | | | |
| | | | | 635 | | | | | 640 | | | | | 645 | | | |
| Gln | Ala | Pro | Cys | Val | Asp | Gly | Phe | Glu | Glu | Pro | Gly | Ala | Arg | Gln | | | |
| | | | | 650 | | | | | 655 | | | | | 660 | | | |
| Arg | Ala | Leu | Ser | Ala | Val | Ser | Val | Leu | Thr | Ser | Ala | Leu | Glu | Glu | | | |
| | | | | 665 | | | | | 670 | | | | | 675 | | | |
| Leu | Glu | Glu | Ser | Arg | His | Lys | Cys | Pro | Pro | Cys | Trp | Asn | Arg | Leu | | | |
| | | | | 680 | | | | | 685 | | | | | 690 | | | |
| Ala | Gln | Arg | Tyr | Leu | Ile | Trp | Glu | Cys | Cys | Pro | Leu | Trp | Met | Ser | | | |
| | | | | 695 | | | | | 700 | | | | | 705 | | | |
| Ile | Lys | Gln | Gly | Val | Lys | Leu | Val | Val | Met | Asp | Pro | Phe | Thr | Asp | | | |
| | | | | 710 | | | | | 715 | | | | | 720 | | | |
| Leu | Thr | Ile | Thr | Met | Cys | Ile | Val | Leu | Asn | Thr | Leu | Phe | Met | Ala | | | |
| | | | | 725 | | | | | 730 | | | | | 735 | | | |
| Leu | Glu | His | Tyr | Asn | Met | Thr | Ser | Glu | Phe | Glu | Glu | Met | Leu | Gln | | | |
| | | | | 740 | | | | | 745 | | | | | 750 | | | |
| Val | Gly | Asn | Leu | Val | Phe | Thr | Gly | Ile | Phe | Thr | Ala | Glu | Met | Thr | | | |
| | | | | 755 | | | | | 760 | | | | | 765 | | | |
| Phe | Lys | Ile | Ile | Ala | Leu | Asp | Pro | Tyr | Tyr | Tyr | Phe | Gln | Gln | Gly | | | |
| | | | | 770 | | | | | 775 | | | | | 780 | | | |
| Trp | Asn | Ile | Phe | Asp | Ser | Ile | Ile | Val | Ile | Leu | Ser | Leu | Met | Glu | | | |
| | | | | 785 | | | | | 790 | | | | | 795 | | | |
| Leu | Gly | Leu | Ser | Arg | Met | Ser | Asn | Leu | Ser | Val | Leu | Arg | Ser | Phe | | | |
| | | | | 800 | | | | | 805 | | | | | 810 | | | |
| Arg | Leu | Leu | Arg | Val | Phe | Lys | Leu | Ala | Lys | Ser | Trp | Pro | Thr | Leu | | | |
| | | | | 815 | | | | | 820 | | | | | 825 | | | |
| Asn | Thr | Leu | Ile | Lys | Ile | Ile | Gly | Asn | Ser | Val | Gly | Ala | Leu | Gly | | | |
| | | | | 830 | | | | | 835 | | | | | 840 | | | |
| Asn | Leu | Thr | Leu | Val | Leu | Ala | Ile | Ile | Val | Phe | Ile | Phe | Ala | Val | | | |
| | | | | 845 | | | | | 850 | | | | | 855 | | | |
| Val | Gly | Met | Gln | Leu | Phe | Gly | Lys | Asn | Tyr | Ser | Glu | Leu | Arg | Asp | | | |
| | | | | 860 | | | | | 865 | | | | | 870 | | | |
| Ser | Asp | Ser | Gly | Leu | Leu | Pro | Arg | Trp | His | Met | Met | Asp | Phe | Phe | | | |
| | | | | 875 | | | | | 880 | | | | | 885 | | | |
| His | Ala | Phe | Leu | Ile | Ile | Phe | Arg | Ile | Leu | Cys | Gly | Glu | Trp | Ile | | | |
| | | | | 890 | | | | | 895 | | | | | 900 | | | |

| | | |
|-----------------|---------------------|-------------------------|
| Glu Thr Met Trp | Asp Cys Met Glu Val | Ser Gly Gln Ser Leu Cys |
| 905 | | 910 915 |
| Leu Leu Val Phe | Leu Leu Val Met Val | Ile Gly Asn Leu Val Val |
| 920 | | 925 930 |
| Leu Asn Leu Phe | Leu Ala Leu Leu Leu | Ser Ser Phe Ser Ala Asp |
| 935 | | 940 945 |
| Asn Leu Thr Ala | Pro Asp Glu Asp Arg | Glu Met Asn Asn Leu Gln |
| 950 | | 955 960 |
| Leu Ala Leu Ala | Arg Ile Gln Arg Gly | Leu Arg Phe Val Lys Arg |
| 965 | | 970 975 |
| Thr Thr Trp Asp | Phe Cys Cys Gly Leu | Leu Arg His Arg Pro Gln |
| 980 | | 985 990 |
| Lys Pro Ala Ala | Leu Ala Ala Gln Gly | Gln Leu Pro Ser Cys Ile |
| 995 | | 1000 1005 |
| Ala Thr Pro Tyr | Ser Pro Pro Pro Pro | Glu Thr Glu Lys Val Pro |
| 1010 | | 1015 1020 |
| Pro Thr Arg Lys | Glu Thr Gln Phe Glu | Glu Gly Glu Gln Pro Gly |
| 1025 | | 1030 1035 |
| Gln Gly Thr Pro | Gly Asp Pro Glu Pro | Val Cys Val Pro Ile Ala |
| 1040 | | 1045 1050 |
| Val Ala Glu Ser | Asp Thr Asp Asp Gln | Glu Glu Asp Glu Glu Asn |
| 1055 | | 1060 1065 |
| Ser Leu Gly Thr | Glu Glu Glu Ser Ser | Lys Gln Gln Glu Ser Gln |
| 1070 | | 1075 1080 |
| Pro Val Ser Gly | Trp Pro Arg Gly Pro | Pro Asp Ser Arg Thr Trp |
| 1085 | | 1090 1095 |
| Ser Gln Val Ser | Ala Thr Ala Ser Ser | Glu Ala Glu Ala Ser Ala |
| 1100 | | 1105 1110 |
| Ser Gln Ala Asp | Trp Arg Gln Gln Trp | Lys Ala Glu Pro Gln Ala |
| 1115 | | 1120 1125 |
| Pro Gly Cys Gly | Glu Thr Pro Glu Asp | Ser Cys Ser Glu Gly Ser |
| 1130 | | 1135 1140 |
| Thr Ala Asp Met | Thr Asn Thr Ala Glu | Leu Leu Glu Gln Ile Pro |
| 1145 | | 1150 1155 |
| Asp Leu Gly Gln | Asp Val Lys Asp Pro | Glu Asp Cys Phe Thr Glu |
| 1160 | | 1165 1170 |

| | | | |
|-----------------|---------------------|---------------------|------|
| Gly Cys Val Arg | Arg Cys Pro Cys Cys | Ala Val Asp Thr Thr | Gln |
| 1175 | | 1180 | 1185 |
| Ala Pro Gly Lys | Val Trp Trp Arg Leu | Arg Lys Thr Cys Tyr | His |
| 1190 | | 1195 | 1200 |
| Ile Val Glu His | Ser Trp Phe Glu Thr | Phe Ile Ile Phe Met | Ile |
| 1205 | | 1210 | 1215 |
| Leu Leu Ser Ser | Gly Ala Leu Ala Phe | Glu Asp Ile Tyr Leu | Glu |
| 1220 | | 1225 | 1230 |
| Glu Arg Lys Thr | Ile Lys Val Leu Leu | Glu Tyr Ala Asp Lys | Met |
| 1235 | | 1240 | 1245 |
| Phe Thr Tyr Val | Phe Val Leu Glu Met | Leu Leu Lys Trp Val | Ala |
| 1250 | | 1255 | 1260 |
| Tyr Gly Phe Lys | Lys Tyr Phe Thr Asn | Ala Trp Cys Trp Leu | Asp |
| 1265 | | 1270 | 1275 |
| Phe Leu Ile Val | Asp Val Ser Leu Val | Ser Leu Val Ala Asn | Thr |
| 1280 | | 1285 | 1290 |
| Leu Gly Phe Ala | Glu Met Gly Pro Ile | Lys Ser Leu Arg Thr | Leu |
| 1295 | | 1300 | 1305 |
| Arg Ala Leu Arg | Pro Leu Arg Ala Leu | Ser Arg Phe Glu Gly | Met |
| 1310 | | 1315 | 1320 |
| Arg Val Val Val | Asn Ala Leu Val Gly | Ala Ile Pro Ser Ile | Met |
| 1325 | | 1330 | 1335 |
| Asn Val Leu Leu | Val Cys Leu Ile Phe | Trp Leu Ile Phe Ser | Ile |
| 1340 | | 1345 | 1350 |
| Met Gly Val Asn | Leu Phe Ala Gly Lys | Phe Gly Arg Cys Ile | Asn |
| 1355 | | 1360 | 1365 |
| Gln Thr Glu Gly | Asp Leu Pro Leu Asn | Tyr Thr Ile Val Asn | Asn |
| 1370 | | 1375 | 1380 |
| Lys Ser Gln Cys | Glu Ser Leu Asn Leu | Thr Gly Glu Leu Tyr | Trp |
| 1385 | | 1390 | 1395 |
| Thr Lys Val Lys | Val Asn Phe Asp Asn | Val Gly Ala Gly Tyr | Leu |
| 1400 | | 1405 | 1410 |
| Ala Leu Leu Gln | Val Ala Thr Phe Lys | Gly Trp Met Asp Ile | Met |
| 1415 | | 1420 | 1425 |
| Tyr Ala Ala Val | Asp Ser Arg Gly Tyr | Glu Glu Gln Pro Gln | Trp |
| 1430 | | 1435 | 1440 |

| | | | |
|---|------|------|------|
| Glu Tyr Asn Leu Tyr Met Tyr Ile Tyr Phe Val Ile Phe Ile Ile | 1445 | 1450 | 1455 |
| Phe Gly Ser Phe Phe Thr Leu Asn Leu Phe Ile Gly Val Ile Ile | 1460 | 1465 | 1470 |
| Asp Asn Phe Asn Gln Gln Lys Lys Lys Leu Gly Gly Gln Asp Ile | 1475 | 1480 | 1485 |
| Phe Met Thr Glu Glu Gln Lys Lys Tyr Tyr Asn Ala Met Lys Lys | 1490 | 1495 | 1500 |
| Leu Gly Ser Lys Lys Pro Gln Lys Pro Ile Pro Arg Pro Leu Asn | 1505 | 1510 | 1515 |
| Lys Tyr Gln Gly Phe Ile Phe Asp Ile Val Thr Lys Gln Ala Phe | 1520 | 1525 | 1530 |
| Asp Val Thr Ile Met Phe Leu Ile Cys Leu Asn Met Val Thr Met | 1535 | 1540 | 1545 |
| Met Val Glu Thr Asp Asp Gln Ser Pro Glu Lys Ile Asn Ile Leu | 1550 | 1555 | 1560 |
| Ala Lys Ile Asn Leu Leu Phe Val Ala Ile Phe Thr Gly Glu Cys | 1565 | 1570 | 1575 |
| Ile Val Lys Leu Ala Ala Leu Arg His Tyr Tyr Phe Thr Asn Ser | 1580 | 1585 | 1590 |
| Trp Asn Ile Phe Asp Phe Val Val Val Ile Leu Ser Ile Val Gly | 1595 | 1600 | 1605 |
| Thr Val Leu Ser Asp Ile Ile Gln Lys Tyr Phe Phe Ser Pro Thr | 1610 | 1615 | 1620 |
| Leu Phe Arg Val Ile Arg Leu Ala Arg Ile Gly Arg Ile Leu Arg | 1625 | 1630 | 1635 |
| Leu Ile Arg Gly Ala Lys Gly Ile Arg Thr Leu Leu Phe Ala Leu | 1640 | 1645 | 1650 |
| Met Met Ser Leu Pro Ala Leu Phe Asn Ile Gly Leu Leu Leu Phe | 1655 | 1660 | 1665 |
| Leu Val Met Phe Ile Tyr Ser Ile Phe Gly Met Ala Asn Phe Ala | 1670 | 1675 | 1680 |
| Tyr Val Lys Trp Glu Ala Gly Ile Asp Asp Met Phe Asn Phe Gln | 1685 | 1690 | 1695 |
| Thr Phe Ala Asn Ser Met Leu Cys Leu Phe Gln Ile Thr Thr Ser | 1700 | 1705 | 1710 |

| | | |
|-----------------|---------------------|-------------------------|
| Ala Gly Trp Asp | Gly Leu Leu Ser Pro | Ile Leu Asn Thr Gly Pro |
| 1715 | | 1725 |
| Pro Tyr Cys Asp | Pro Thr Leu Pro Asn | Ser Asn Gly Ser Arg Gly |
| 1730 | | 1740 |
| Asp Cys Gly Ser | Pro Ala Val Gly Ile | Leu Phe Phe Thr Thr Tyr |
| 1745 | | 1755 |
| Ile Ile Ile Ser | Phe Leu Ile Val Val | Asn Met Tyr Ile Ala Ile |
| 1760 | | 1770 |
| Ile Leu Glu Asn | Phe Ser Val Ala Thr | Glu Glu Ser Thr Glu Pro |
| 1775 | | 1785 |
| Leu Ser Glu Asp | Asp Phe Asp Met Phe | Tyr Glu Ile Trp Glu Lys |
| 1790 | | 1800 |
| Phe Asp Pro Glu | Ala Thr Gln Phe Ile | Glu Tyr Ser Val Leu Ser |
| 1805 | | 1815 |
| Asp Phe Ala Asp | Ala Leu Ser Glu Pro | Leu Ile Arg Ala Lys Pro |
| 1820 | | 1830 |
| Asn Gln Ile Ser | Leu Ile Asn Met Asp | Leu Pro Met Val Ser Gly |
| 1835 | | 1845 |
| Asp Arg Ile His | Cys Met Asp Ile Leu | Phe Ala Phe Thr Lys Arg |
| 1850 | | 1860 |
| Val Leu Gly Glu | Ser Gly Glu Met Asp | Ala Leu Lys Ile Gln Met |
| 1865 | | 1875 |
| Glu Glu Lys Phe | Met Ala Ala Asn Pro | Ser Lys Ile Ser Tyr Glu |
| 1880 | | 1890 |
| Pro Ile Thr Thr | Thr Leu Arg Arg Lys | His Glu Glu Val Ser Ala |
| 1895 | | 1905 |
| Met Val Ile Gln | Arg Ala Phe Arg Arg | His Leu Leu Gln Arg Ser |
| 1910 | | 1920 |
| Leu Lys His Ala | Ser Phe Leu Phe Arg | Gln Gln Ala Gly Ser Gly |
| 1925 | | 1935 |
| Leu Ser Glu Glu | Asp Ala Pro Glu Arg | Glu Gly Leu Ile Ala Tyr |
| 1940 | | 1950 |
| Val Met Ser Glu | Asn Phe Ser Arg Pro | Leu Gly Pro Pro Ser Ser |
| 1955 | | 1965 |
| Ser Ser Ile Ser | Ser Thr Ser Phe Pro | Pro Ser Tyr Asp Ser Val |
| 1970 | | 1980 |

Thr Arg Ala Thr Ser Asp Asn Leu Gln Val Arg Gly Ser Asp Tyr
 1985 1990 1995
 Ser His Ser Glu Asp Leu Ala Asp Phe Pro Pro Ser Pro Asp Arg
 2000 2005 2010
 Asp Arg Glu Ser Ile Val
 2015

(2) INFORMATION FOR SEQ ID NO:3:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 24 bases
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:3:

ATGGCAAAC TCCTATTACC TCGG 24

(2) INFORMATION FOR SEQ ID NO:4:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 24 bases
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:4:

CACGATGGAC TCACGGTCCC TGTC 24

(2) INFORMATION FOR SEQ ID NO:5:

(I) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 3069 bases
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: double
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:5:

ATG GGG AAG GGG GTT GGA CGT GAT AAG TAT GAG CCT GCA GCT GTT 45
 Met Gly Lys Gly Val Gly Arg Asp Lys Tyr Glu Pro Ala Ala Val
 1 5 10 15

TCA GAA CAA GGT GAT AAA AAG GGC AAA AAG GGC AAA AAA GAC AGG 90
 Ser Glu Gln Glu Asp Lys Lys Glu Lys Lys Glu Lys Lys Asp Arg
 20 25 30

GAC ATG GAT GAA CTG AAG AAA GAA GTT TCT ATG GAT GAT CAT AAA 135
 Asp Met Asp Glu Leu Lys Lys Glu Val Ser Met Asp Asp His Lys
 35 40 45

CTT AGC CTT GAT GAA CTT CAT CGT AAA TAT GGA ACA GAC TTG AGC 180
 Leu Ser Leu Asp Glu Leu His Arg Lys Tyr Gly Thr Asp Leu Ser
 50 55 60

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| CGG | GGA | TTA | ACA | TCT | GCT | CGT | GCA | GCT | GAG | ATC | CTG | GCG | CGA | GAT | 225 |
| Arg | Gly | Leu | Thr | Ser | Ala | Arg | Ala | Ala | Glu | Ile | Leu | Ala | Arg | Asp | |
| | | | | 65 | | | | | 70 | | | | | 75 | |
| GGT | CCC | AAC | GCC | CTC | ACT | CCC | CCT | CCC | ACT | ACT | CCT | GAA | TGG | ATC | 270 |
| Gly | Pro | Asn | Ala | Leu | Thr | Pro | Pro | Pro | Thr | Thr | Pro | Glu | Trp | Ile | |
| | | | | 80 | | | | | 85 | | | | | 90 | |
| AAG | TTT | TGT | CGG | CAG | CTC | TTT | GGG | GGG | TTC | TCA | ATG | TTA | CTG | TGG | 315 |
| Lys | Phe | Cys | Arg | Gln | Leu | Phe | Gly | Gly | Phe | Ser | Met | Leu | Leu | Trp | |
| | | | | 95 | | | | | 100 | | | | | 105 | |
| ATT | GGA | GCG | ATT | CTT | TGT | TTC | TTG | GCT | TAT | AGC | ATC | CAA | GCT | GCT | 360 |
| Ile | Gly | Ala | Ile | Leu | Cys | Phe | Leu | Ala | Tyr | Ser | Ile | Gln | Ala | Ala | |
| | | | | 110 | | | | | 115 | | | | | 120 | |
| ACA | GAA | GAG | GAA | CCT | CAA | AAC | GAT | AAT | CTG | TAC | CTG | GGT | GTG | GTG | 405 |
| Thr | Glu | Glu | Glu | Pro | Gln | Asn | Asp | Asn | Leu | Tyr | Leu | Gly | Val | Val | |
| | | | | 125 | | | | | 130 | | | | | 135 | |
| CTA | TCA | GCC | GTT | GTA | ATC | ATA | ACT | GGT | TGC | TTC | TCC | TAC | TAT | CAA | 450 |
| Leu | Ser | Ala | Val | Val | Ile | Ile | Thr | Gly | Cys | Phe | Ser | Tyr | Tyr | Gln | |
| | | | | 140 | | | | | 145 | | | | | 150 | |
| GAA | GCT | AAA | AGT | TCA | AAG | ATC | ATG | GAA | TCC | TTC | AAA | AAC | ATG | GTC | 495 |
| Glu | Ala | Lys | Ser | Ser | Lys | Ile | Met | Glu | Ser | Phe | Lys | Asn | Met | Val | |
| | | | | 155 | | | | | 160 | | | | | 165 | |
| CCT | CAG | CAA | GCC | CTT | GTG | ATT | CGA | AAT | GGT | GAG | AAA | ATG | AGC | ATA | 540 |
| Pro | Gln | Gln | Ala | Leu | Val | Ile | Arg | Asn | Gly | Glu | Lys | Met | Ser | Ile | |
| | | | | 170 | | | | | 175 | | | | | 180 | |
| AAT | GCG | GAG | GAA | GTT | GTG | GTT | GGG | GAT | CTG | GTG | GAA | GTA | AAA | GGA | 585 |
| Asn | Ala | Glu | Glu | Val | Val | Val | Gly | Asp | Lue | Val | Glu | Val | Lys | Gly | |
| | | | | 185 | | | | | 190 | | | | | 195 | |
| GGA | GAC | CGA | ATT | CCT | GCT | GAC | CTC | AGA | ATC | ATA | TCT | GCA | AAT | GGC | 630 |
| Gly | Asp | Arg | Ile | Pro | Ala | Asp | Leu | Arg | Ile | Ile | Ser | Ala | Asn | Gly | |
| | | | | 200 | | | | | 205 | | | | | 210 | |
| TGC | AAG | GTG | GAT | AAC | TCC | TCG | CTC | ACT | GGT | GAA | TCA | GAA | CCC | CAG | 675 |
| Cys | Lys | Val | Asp | Asn | Ser | Ser | Leu | Thr | Gly | Glu | Ser | Glu | Pro | Gln | |
| | | | | 215 | | | | | 220 | | | | | 225 | |
| ACT | AGG | TCT | CCA | GAT | TTC | ACA | AAT | GAA | AAC | CCC | CTG | GAG | ACG | AGG | 720 |
| Thr | Arg | Ser | Pro | Asp | Phe | Thr | Asn | Glu | Asn | Pro | Leu | Glu | Thr | Arg | |
| | | | | 230 | | | | | 235 | | | | | 240 | |
| AAC | ATT | GCC | TTC | TTT | TCA | ACA | AAT | TGT | GTT | GAA | GGC | ACC | GCA | CGT | 765 |
| Asn | Ile | Ala | Phe | Phe | Ser | Thr | Asn | Cys | Val | Glu | Gly | Thr | Ala | Arg | |
| | | | | 245 | | | | | 250 | | | | | 255 | |
| GGT | ATT | GTT | GTC | TAC | ACT | GGG | GAT | CGC | ACT | GTG | ATG | GGA | AGA | ATT | 810 |
| Gly | Ile | Val | Val | Tyr | Thr | Gly | Asp | Arg | Thr | Val | Met | Gly | Arg | Ile | |
| | | | | 260 | | | | | 265 | | | | | 270 | |

| | |
|---|------|
| GCC ACA CTT GCT TCT GGG CTG GAA GGA GGC CAG ACC CCC ATT GCT | 855 |
| Ala Thr Leu Ala Ser Gly Leu Glu Gly Gly Gln Thr Pro Ile Ala | |
| 275 280 285 | |
| GCA GAA ATT GAA CAT TTT ATC CAC ATC ATC ACG GGT GTG GCT GTG | 900 |
| Ala Glu Ile Glu His Phe Ile His Ile Ile Thr Gly Val Ala Val | |
| 290 295 300 | |
| TTC CTG GGT GTG TCT TTC TTC ATC CTT TCT CTC ATC CTT GAG TAC | 945 |
| Phe Leu Gly Val Ser Phe Phe Ile Leu Ser Leu Ile Leu Glu Tyr | |
| 305 310 315 | |
| ACC TGG CTT GAG GCT GTC ATC TTC CTC ATC GGT ATC ATC GTA GCC | 990 |
| Thr Trp Leu Glu Ala Val Ile Phe Leu Ile Gly Ile Ile Val Ala | |
| 320 325 330 | |
| AAT GTG CCG GAA GGT TTG CTG GCC ACT GTC ACG GTC TGT CTG ACA | 1035 |
| Asn Val Pro Glu Gly Leu Leu Ala Thr Val Thr Val Cys Leu Thr | |
| 335 340 345 | |
| CTT ACT GCC AAA CGC ATG GCA AGG AAA AAC TGC TTA GTG AAG AAC | 1080 |
| Leu Thr Ala Lys Arg Met Ala Arg Lys Asn Cys Leu Val Lys Asn | |
| 350 355 360 | |
| TTA GAA GCT GTG GAG ACC TTG GGG TCC ACG TCC ACC ATC TGC TCT | 1125 |
| Leu Glu Ala Val Glu Thr Leu Gly Ser Thr Ser Thr Ile Cys Ser | |
| 365 370 375 | |
| GAT AAA ACT GGA ACT CTG ACT CAG AAC CGG ATG ACA GTG GCC CAC | 1170 |
| Asp Lys Thr Gly Thr Leu Thr Gln Asn Arg Met Thr Val Ala His | |
| 380 385 390 | |
| ATG TGG TTT GAC AAT CAA ATC CAT GAA GCT GAT ACG ACA GAG AAT | 1215 |
| Met Trp Phe Asp Asn Gln Ile His Glu Ala Asp Thr Thr Glu Asn | |
| 395 400 405 | |
| CAG AGT GGT GTC TCT TTT GAC AAG ACT TCA GCT ACC TGG CTT GCT | 1260 |
| Gln Ser Gly Val Ser Phe Asp Lys Thr Ser Ala Thr Trp Leu Ala | |
| 410 415 420 | |
| CTG TCC AGA ATT GCA GGT CTT TGT AAC AGG GCA GTG TTT CAG GCT | 1305 |
| Leu Ser Arg Ile Ala Gly Leu Cys Asn Arg Ala Val Phe Gln Ala | |
| 425 430 435 | |
| AAC CAG GAA AAC CTA CCT ATT CTT AAG CGG GCA GTT GCA GGA GAT | 1350 |
| Asn Gln Glu Asn Leu Pro Ile Leu Lys Arg Ala Val Ala Gly Asp | |
| 440 445 450 | |
| GCC TCT GAG TCA GCA CTC TTA AAG TGC ATA GAG CTG TGC TGT GGT | 1395 |
| Ala Ser Glu Ser Ala Leu Leu Lys Cys Ile Glu Leu Cys Cys Gly | |
| 455 460 465 | |
| TTC GTG AAG GAG ATG AGA GAA AGA TAC GCC AAA ATC GTC GAG ATA | 1440 |
| Ser Val Lys Glu Met Arg Glu Arg Tyr Ala Lys Ile Val Glu Ile | |
| 470 475 480 | |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|
| CCC | TTC | AAC | TCC | ACC | AAC | AAG | TAC | CAG | TTG | TCT | ATT | CAT | AAG | AAC | 1485 |
| Pro | Phe | Asn | Ser | Thr | Asn | Lys | Tyr | Gln | Leu | Ser | Ile | His | Lys | Asn | |
| | | | | 485 | | | | | 490 | | | | | 495 | |
| CCC | AAC | ACA | TCG | GAG | CCC | CAA | CAC | CTG | TTG | GTG | ATG | AAG | GGC | GCC | 1520 |
| Pro | Asn | Thr | Ser | Glu | Pro | Gln | His | Leu | Leu | Val | Met | Lys | Gly | Ala | |
| | | | | 500 | | | | | 505 | | | | | 510 | |
| CCA | GAA | AGG | ATC | CTA | GAC | CGT | TGC | AGC | TCT | ATC | CTC | CTC | CAC | GGC | 1565 |
| Pro | Glu | Arg | Ile | Leu | Asp | Arg | Cys | Ser | Ser | Ile | Leu | Leu | His | Gly | |
| | | | | 515 | | | | | 520 | | | | | 525 | |
| AAG | GAG | CAG | CCC | CTG | GAT | GAG | GAG | CTG | AAA | GAC | GCC | TTT | CAG | AAC | 1620 |
| Lys | Glu | Gln | Pro | Leu | Asp | Glu | Glu | Leu | Lys | Asp | Ala | Phe | Gln | Asn | |
| | | | | 530 | | | | | 535 | | | | | 540 | |
| GCC | TAT | TTG | GAG | CTG | GGG | GGC | CTC | GGA | GAA | CGA | GTC | CTA | GGT | TTC | 1665 |
| Ala | Tyr | Leu | Glu | Leu | Gly | Gly | Leu | Gly | Glu | Arg | Val | Leu | Gly | Phe | |
| | | | | 545 | | | | | 550 | | | | | 555 | |
| TGC | CAC | CTC | TTT | CTG | CCA | GAT | GAA | CAG | TTT | CCT | GAA | GGG | TTC | CAG | 1710 |
| Cys | His | Leu | Phe | Leu | Pro | Asp | Glu | Gln | Phe | Pro | Glu | Gly | Phe | Gln | |
| | | | | 560 | | | | | 565 | | | | | 570 | |
| TTT | GAC | ACT | GAC | GAT | GTG | AAT | TTC | CCT | ATC | GAT | AAT | CTG | TGC | TTC | 1755 |
| Phe | Asp | Thr | Asp | Asp | Val | Asn | Phe | Pro | Ile | Asp | Asn | Leu | Cys | Phe | |
| | | | | 575 | | | | | 580 | | | | | 585 | |
| GTT | GGG | CTC | ATC | TCC | ATG | ATT | GAC | CCT | CCA | CGG | GCG | GCC | GTT | CCT | 1800 |
| Val | Gly | Leu | Ile | Ser | Met | Ile | Asp | Pro | Pro | Arg | Ala | Ala | Val | Pro | |
| | | | | 590 | | | | | 595 | | | | | 600 | |
| GAT | GCC | GTG | GGC | AAA | TGT | CGA | AGT | GCT | GGA | ATT | AAG | GTC | ATC | ATG | 1845 |
| Asp | Ala | Val | Gly | Lys | Cys | Arg | Ser | Ala | Gly | Ile | Lys | Val | Ile | Met | |
| | | | | 605 | | | | | 610 | | | | | 615 | |
| GTC | ACA | GGA | GAC | CAT | CCA | ATC | ACA | GCT | AAA | GCT | ATT | GCC | AAA | GGT | 1890 |
| Val | Thr | Gly | Asp | His | Pro | Ile | Thr | Ala | Lys | Ala | Ile | Ala | Lys | Gly | |
| | | | | 620 | | | | | 625 | | | | | 630 | |
| GTG | GGC | ATC | ATC | TCA | GAA | GGC | ATG | GAG | ACC | GTG | GAA | GAC | ATT | GCT | 1935 |
| Val | Gly | Ile | Ile | Ser | Glu | Gly | Asn | Glu | Thr | Val | Glu | Asp | Ile | Ala | |
| | | | | 635 | | | | | 640 | | | | | 645 | |
| GCC | CGC | CTC | AAC | ATC | CCA | GTC | AGC | CAG | GTG | AAC | CCC | AGG | GAT | GCC | 1980 |
| Ala | Arg | Leu | Asn | Ile | Pro | Val | Ser | Gln | Val | Asn | Pro | Arg | Asp | Ala | |
| | | | | 650 | | | | | 655 | | | | | 660 | |
| AAG | GCC | TGC | GTA | GTA | CAC | GGC | AGT | GAT | CTA | AAG | GAC | ATG | ACC | TCC | 2025 |
| Lys | Ala | Cys | Val | Val | His | Gly | Ser | Asp | Leu | Lys | Asp | Met | Thr | Ser | |
| | | | | 665 | | | | | 670 | | | | | 675 | |
| GAG | CAG | CTG | GAT | GAC | ATT | TTG | AAG | TAC | CAC | ACT | GAG | ATA | GTG | TTT | 2070 |
| Glu | Gln | Leu | Asp | Asp | Ile | Leu | Lys | Tyr | His | Thr | Glu | Ile | Val | Phe | |
| | | | | 680 | | | | | 685 | | | | | 690 | |

| | |
|---|------|
| GCC AGG ACC TCC CCT CAG CAG AAG CTC ATC ATT GTG GAA GGC TGC | 2115 |
| Ala Arg Thr Ser Pro Gln Gln Lys Leu Ile Ile Val Glu Gly Cys | |
| 695 700 705 | |
| CAA AGA CAG GGT GCT ATC GTG GCT GTG ACT GGT GAC GGT GTG AAT | 2160 |
| Gln Arg Gln Gly Ala Ile Val Ala Val Thr Gly Asp Gly Val Asn | |
| 710 715 720 | |
| GAC TCT CCA GCT TTG AAG AAA GCA GAC ATT GGG GTT GCT ATG GGG | 2205 |
| Asp Ser Pro Ala Leu Lys Lys Ala Asp Ile Gly Val Ala Met Gly | |
| 725 730 735 | |
| ATT GCT GGC TCA GAT GTG TCC AAG CAA GCT GCT GAC ATG ATT CTT | 2250 |
| Ile Ala Gly Ser Asp Val Ser Lys Gln Ala Ala Asp Met Ile Leu | |
| 740 745 750 | |
| CTG GAT GAC AAC TTT GCC TCA ATT GTG ACT GGA GTA GAG GAA GGT | 2295 |
| Leu Asp Asp Asn Phe Ala Ser Ile Val Thr Gly Val Glu Glu Gly | |
| 755 760 765 | |
| CGT CTG ATC TTT GAT AAC TTG AAG AAA TCC ATT GCT TAT ACC TTA | 2340 |
| Arg Leu Ile Phe Asp Asn Leu Lys Lys Ser Ile Ala Tyr Thr Leu | |
| 770 775 780 | |
| ACC AGT AAC ATT CCC GAG ATC ACC CCG TTC CTG ATA TTT ATT ATT | 2385 |
| Thr Ser Asn Ile Pro Glu Ile Thr Pro Phe Leu Ile Phe Ile Ile | |
| 785 790 795 | |
| GCA AAC ATT CCA CTA CCA CTG GGG ACT GTC ACC ATC CTC TGC ATT | 2430 |
| Ala Asn Ile Pro Leu Pro Leu Gly Thr Val Thr Ile Leu Cys Ile | |
| 800 805 810 | |
| GAC TTG GGC ACT GAC ATG GTT CCT GCC ATC TCC CTG GCT TAT GAG | 2475 |
| Asp Leu Gly Thr Asp Met Val Pro Ala Ile Ser Leu Ala Tyr Glu | |
| 815 820 825 | |
| CAG GCT GAG AGT GAC ATC ATG AAG AGA CAG CCC AGA AAT CCC AAA | 2520 |
| Gln Ala Glu Ser Asp Ile Met Lys Arg Gln Pro Arg Asn Pro Lys | |
| 830 835 840 | |
| ACA GAC AAA CTT GTG AAT GAG CGG CTG ATC AGC ATG GCC TAT GGG | 2565 |
| Thr Asp Lys Leu Val Asn Glu Arg Leu Ile Ser Met Ala Tyr Gly | |
| 845 850 855 | |
| CAG ATT GGA ATG ATC CAG GCC CTG GGA GGC TTC TTT ACT TAC TTT | 2610 |
| Gln Ile Gly Met Ile Gln Ala Leu Gly Gly Phe Phe Thr Tyr Phe | |
| 860 865 870 | |
| GTG ATT CTG GCT GAG AAC GGC TTC CTC CCA ATT CAC CTG TTG GGC | 2655 |
| Val Ile Leu Ala Glu Asn Gly Phe Leu Pro Ile His Leu Leu Gly | |
| 875 880 885 | |
| CTC CGA GTG GAC TGG GAT GAC CGC TGG ATC AAC GAT GTG GAA GAC | 2700 |
| Leu Arg Val Asp Trp Asp Asp Arg Trp Ile Asn Asp Val Glu Asp | |

Leu Ser Leu Asp Glu Leu His Arg Lys Tyr Gly Thr Asp Leu Ser

| | | |
|---|-----|-----|
| 50 | 55 | 60 |
| Arg Gly Leu Thr Ser Ala Arg Ala Ala Glu Ile Leu Ala Arg Asp | | |
| 65 | 70 | 75 |
| Gly Pro Asn Ala Leu Thr Pro Pro Pro Thr Thr Pro Glu Trp Ile | | |
| 80 | 85 | 90 |
| Lys Phe Cys Arg Gln Leu Phe Gly Gly Phe Ser Met Leu Leu Trp | | |
| 95 | 100 | 105 |
| Ile Gly Ala Ile Leu Cys Phe Leu Ala Tyr Ser Ile Gln Ala Ala | | |
| 110 | 115 | 120 |
| Thr Glu Glu Glu Pro Gln Asn Asp Asn Leu Tyr Leu Gly Val Val | | |
| 125 | 130 | 135 |
| Leu Ser Ala Val Val Ile Ile Thr Gly Cys Phe Ser Tyr Tyr Gln | | |
| 140 | 145 | 150 |
| Glu Ala Lys Ser Ser Lys Ile Met Glu Ser Phe Lys Asn Met Val | | |
| 155 | 160 | 165 |
| Pro Gln Gln Ala Leu Val Ile Arg Asn Gly Glu Lys Met Ser Ile | | |
| 170 | 175 | 180 |
| Asn Ala Glu Glu Val Val Val Gly Asp Lue Val Glu Val Lys Gly | | |
| 185 | 190 | 195 |
| Gly Asp Arg Ile Pro Ala Asp Leu Arg Ile Ile Ser Ala Asn Gly | | |
| 200 | 205 | 210 |
| Cys Lys Val Asp Asn Ser Ser Leu Thr Gly Glu Ser Glu Pro Gln | | |
| 215 | 220 | 225 |
| Thr Arg Ser Pro Asp Phe Thr Asn Glu Asn Pro Leu Glu Thr Arg | | |
| 230 | 235 | 240 |
| Asn Ile Ala Phe Phe Ser Thr Asn Cys Val Glu Gly Thr Ala Arg | | |
| 245 | 250 | 255 |
| Gly Ile Val Val Tyr Thr Gly Asp Arg Thr Val Met Gly Arg Ile | | |
| 260 | 265 | 270 |
| Ala Thr Leu Ala Ser Gly Leu Glu Gly Gly Gln Thr Pro Ile Ala | | |
| 275 | 280 | 285 |
| Ala Glu Ile Glu His Phe Ile His Ile Ile Thr Gly Val Ala Val | | |
| 290 | 295 | 300 |
| Phe Leu Gly Val Ser Phe Phe Ile Leu Ser Leu Ile Leu Glu Tyr | | |
| 305 | 310 | 315 |
| Thr Trp Leu Glu Ala Val Ile Phe Leu Ile Gly Ile Ile Val Ala | | |

| | | |
|-------------------------------------|-------------------------|-----|
| 320 | 325 | 330 |
| Asn Val Pro Glu Gly Leu Leu Ala Thr | Val Thr Val Cys Leu Thr | |
| 335 | 340 | 345 |
| Leu Thr Ala Lys Arg Met Ala Arg Lys | Asn Cys Leu Val Lys Asn | |
| 350 | 355 | 360 |
| Leu Glu Ala Val Glu Thr Leu Gly Ser | Thr Ser Thr Ile Cys Ser | |
| 365 | 370 | 375 |
| Asp Lys Thr Gly Thr Leu Thr Gln Asn | Arg Met Thr Val Ala His | |
| 380 | 385 | 390 |
| Met Trp Phe Asp Asn Gln Ile His Glu | Ala Asp Thr Thr Glu Asn | |
| 395 | 400 | 405 |
| Gln Ser Gly Val Ser Phe Asp Lys Thr | Ser Ala Thr Trp Leu Ala | |
| 410 | 415 | 420 |
| Leu Ser Arg Ile Ala Gly Leu Cys Asn | Arg Ala Val Phe Gln Ala | |
| 425 | 430 | 435 |
| Asn Gln Glu Asn Leu Pro Ile Leu Lys | Arg Ala Val Ala Gly Asp | |
| 440 | 445 | 450 |
| Ala Ser Glu Ser Ala Leu Leu Lys Cys | Ile Glu Leu Cys Cys Gly | |
| 455 | 460 | 465 |
| Ser Val Lys Glu Met Arg Glu Arg Tyr | Ala Lys Ile Val Glu Ile | |
| 470 | 475 | 480 |
| Pro Phe Asn Ser Thr Asn Lys Tyr Gln | Leu Ser Ile His Lys Asn | |
| 485 | 490 | 495 |
| Pro Asn Thr Ser Glu Pro Gln His Leu | Leu Val Met Lys Gly Ala | |
| 500 | 505 | 510 |
| Pro Glu Arg Ile Leu Asp Arg Cys Ser | Ser Ile Leu Leu His Gly | |
| 515 | 520 | 525 |
| Lys Glu Gln Pro Leu Asp Glu Glu Leu | Lys Asp Ala Phe Gln Asn | |
| 530 | 535 | 540 |
| Ala Tyr Leu Glu Leu Gly Gly Leu Gly | Glu Arg Val Leu Gly Phe | |
| 545 | 550 | 555 |
| Cys His Leu Phe Leu Pro Asp Glu Gln | Phe Pro Glu Gly Phe Gln | |
| 560 | 565 | 570 |
| Phe Asp Thr Asp Asp Val Asn Phe Pro | Ile Asp Asn Leu Cys Phe | |
| 575 | 580 | 585 |
| Val Gly Leu Ile Ser Met Ile Asp Pro | Pro Arg Ala Ala Val Pro | |

| 590 | | | | | | | | | | 595 | | | | 600 | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|--|
| Asp | Ala | Val | Gly | Lys | Cys | Arg | Ser | Ala | Gly | Gly | Ile | Lys | Val | Ile | Met | | |
| | | | | 605 | | | | | 610 | | | | | | 615 | | |
| Val | Thr | Gly | Asp | His | Pro | Ile | Thr | Ala | Lys | Ala | Ile | Ala | Lys | Gly | | | |
| | | | | 620 | | | | | 625 | | | | | | 630 | | |
| Val | Gly | Ile | Ile | Ser | Glu | Gly | Asn | Glu | Thr | Val | Glu | Asp | Ile | Ala | | | |
| | | | | 635 | | | | | 640 | | | | | | 645 | | |
| Ala | Arg | Leu | Asn | Ile | Pro | Val | Ser | Gln | Val | Asn | Pro | Arg | Asp | Ala | | | |
| | | | | 650 | | | | | 655 | | | | | | 660 | | |
| Lys | Ala | Cys | Val | Val | His | Gly | Ser | Asp | Leu | Lys | Asp | Met | Thr | Ser | | | |
| | | | | 665 | | | | | 670 | | | | | | 675 | | |
| Glu | Gln | Leu | Asp | Asp | Ile | Leu | Lys | Tyr | His | Thr | Glu | Ile | Val | Phe | | | |
| | | | | 680 | | | | | 685 | | | | | | 690 | | |
| Ala | Arg | Thr | Ser | Pro | Gln | Gln | Lys | Leu | Ile | Ile | Val | Glu | Gly | Cys | | | |
| | | | | 695 | | | | | 700 | | | | | | 705 | | |
| Gln | Arg | Gln | Gly | Ala | Ile | Val | Ala | Val | Thr | Gly | Asp | Gly | Val | Asn | | | |
| | | | | 710 | | | | | 715 | | | | | | 720 | | |
| Asp | Ser | Pro | Ala | Leu | Lys | Lys | Ala | Asp | Ile | Gly | Val | Ala | Met | Gly | | | |
| | | | | 725 | | | | | 730 | | | | | | 735 | | |
| Ile | Ala | Gly | Ser | Asp | Val | Ser | Lys | Gln | Ala | Ala | Asp | Met | Ile | Leu | | | |
| | | | | 740 | | | | | 745 | | | | | | 750 | | |
| Leu | Asp | Asp | Asn | Phe | Ala | Ser | Ile | Val | Thr | Gly | Val | Glu | Glu | Gly | | | |
| | | | | 755 | | | | | 760 | | | | | | 765 | | |
| Arg | Leu | Ile | Phe | Asp | Asn | Leu | Lys | Lys | Ser | Ile | Ala | Tyr | Thr | Leu | | | |
| | | | | 770 | | | | | 775 | | | | | | 780 | | |
| Thr | Ser | Asn | Ile | Pro | Glu | Ile | Thr | Pro | Phe | Leu | Ile | Phe | Ile | Ile | | | |
| | | | | 785 | | | | | 790 | | | | | | 795 | | |
| Ala | Asn | Ile | Pro | Leu | Pro | Leu | Gly | Thr | Val | Thr | Ile | Leu | Cys | Ile | | | |
| | | | | 800 | | | | | 805 | | | | | | 810 | | |
| Asp | Leu | Gly | Thr | Asp | Met | Val | Pro | Ala | Ile | Ser | Leu | Ala | Tyr | Glu | | | |
| | | | | 815 | | | | | 820 | | | | | | 825 | | |
| Gln | Ala | Glu | Ser | Asp | Ile | Met | Lys | Arg | Gln | Pro | Arg | Asn | Pro | Lys | | | |
| | | | | 830 | | | | | 835 | | | | | | 840 | | |
| Thr | Asp | Lys | Leu | Val | Asn | Glu | Arg | Leu | Ile | Ser | Met | Ala | Tyr | Gly | | | |
| | | | | 845 | | | | | 850 | | | | | | 855 | | |
| Gln | Ile | Gly | Met | Ile | Gln | Ala | Leu | Gly | Gly | Phe | Phe | Thr | Tyr | Phe | | | |

AGT TGG TTT AAG ATC CTT CTA TTC TAC GTA ATA TTT TAT GGC TGC 135
Ser Trp Phe Lys Ile Leu Leu Phe Tyr Val Ile Phe Tyr Gly Cys.
35 40 45

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| CTG | GCT | GGC | ATC | TTC | ATC | GGA | ACC | ATC | CAA | GTG | ATG | CTG | CTC | ACC | 180 |
| Leu | Ala | Gly | Ile | Phe | Ile | Gly | Thr | Ile | Gln | Val | Met | Leu | Leu | Thr | |
| | | | 50 | | | | | | 55 | | | | | 60 | |
| ATC | AGT | GAA | TTT | AAG | CCC | ACA | TAT | CAG | GAC | CGA | GTG | GCC | CCG | CCA | 225 |
| Ile | Ser | Glu | Phe | Lys | Pro | Thr | Tyr | Gln | Asp | Arg | Val | Ala | Pro | Pro | |
| | | | 65 | | | | | | 70 | | | | | 75 | |
| GGA | TTA | ACA | CAG | ATT | CCT | CAG | ATC | CAG | AAG | ACT | GAA | ATT | TCC | TTT | 270 |
| Gly | Leu | Thr | Gln | Ile | Pro | Gln | Ile | Gln | Lys | Thr | Glu | Ile | Ser | Phe | |
| | | | 80 | | | | | | 85 | | | | | 90 | |
| CGT | CCT | AAT | GAT | CCC | AAG | AGC | TAT | GAG | GCA | TAT | GTA | CTG | AAC | ATA | 315 |
| Arg | Pro | Asn | Asp | Pro | Lys | Ser | Tyr | Glu | Ala | Tyr | Val | Leu | Asn | Ile | |
| | | | 95 | | | | | | 100 | | | | | 105 | |
| GTT | AGG | TTC | CTG | GAA | AAG | TAC | AAA | GAT | TCA | GCC | CAG | AGG | GAT | GAC | 360 |
| Val | Arg | Phe | Leu | Glu | Lys | Tyr | Lys | Asp | Ser | Ala | Gln | Arg | Asp | Asp | |
| | | | 110 | | | | | | 115 | | | | | 120 | |
| ATG | ATT | TTT | GAA | GAT | TGT | GGC | GAT | GTG | CCC | AGT | GAA | CCG | AAA | GAA | 405 |
| Met | Ile | Phe | Glu | Asp | Cys | Gly | Asp | Val | Pro | Ser | Glu | Pro | Lys | Glu | |
| | | | 125 | | | | | | 130 | | | | | 135 | |
| CGA | GGA | GAC | TTT | AAT | CAT | GAA | CGA | GGA | GAG | CGA | AAG | GTC | TGC | AGA | 450 |
| Arg | Gly | Asp | Phe | Asn | His | Glu | Arg | Gly | Glu | Arg | Lys | Val | Cys | Arg | |
| | | | 140 | | | | | | 145 | | | | | 150 | |
| TTC | AAG | CTT | GAA | TGG | CTG | GGA | AAT | TGC | TCT | GGA | TTA | AAT | GAT | GAA | 495 |
| Phy | Lys | Leu | Glu | Trp | Leu | Gly | Asn | Cys | Ser | Gly | Leu | Asn | Asp | Glu | |
| | | | 155 | | | | | | 160 | | | | | 165 | |
| ACT | TAT | GGC | TAC | AAA | GAG | GGC | AAA | CCG | TGC | ATT | ATT | ATA | AAG | CTC | 540 |
| Thr | Tyr | Gly | Tyr | Lys | Glu | Gly | Lys | Pro | Cys | Ile | Ile | Ile | Lys | Leu | |
| | | | 170 | | | | | | 175 | | | | | 180 | |
| AAC | CGA | GTT | CTA | GGC | TTC | AAA | CCT | AAG | CCT | CCC | AAG | AAT | GAG | TCC | 585 |
| Asn | Arg | Val | Leu | Gly | Phe | Lys | Pro | Lys | Pro | Pro | Lys | Asn | Glu | Ser | |
| | | | 185 | | | | | | 190 | | | | | 195 | |
| TTG | GAG | ACT | TAC | CCA | GTG | ATG | AAG | TAT | AAC | CCA | AAT | GTC | CTT | CCC | 630 |
| Leu | Glu | Thr | Tyr | Pro | Val | Met | Lys | Tyr | Asn | Pro | Asn | Val | Leu | Pro | |
| | | | 200 | | | | | | 205 | | | | | 210 | |
| GTT | CAG | TGC | ACT | GGC | AAG | CGA | GAT | GAA | GAT | AAG | GAT | AAA | GTT | GGA | 675 |
| Val | Gln | Cys | Thr | Gly | Lys | Arg | Asp | Glu | Asp | Lys | Asp | Lys | Val | Gly | |
| | | | 215 | | | | | | 220 | | | | | 225 | |
| AAT | GTG | GAG | TAT | TTT | GGA | CTG | GGC | AAC | TCC | CCT | GGT | TTT | CCT | CTG | 720 |
| Asn | Val | Glu | Tyr | Phe | Gly | Leu | Gly | Asn | Ser | Pro | Gly | Phe | Pro | Leu | |
| | | | 230 | | | | | | 235 | | | | | 240 | |
| CAG | TAT | TAT | CCG | TAC | TAT | GGC | AAA | CTC | CTG | CAG | CCC | AAA | TAC | CTG | 765 |

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Gln | Tyr | Tyr | Pro | Tyr | Tyr | Gly | Lys | Leu | Leu | Gln | Pro | Lys | Tyr | Leu | |
| | | | | 245 | | | | | 250 | | | | | 255 | |
| CAG | CCC | CTG | CTG | GCC | GTA | CAG | TTC | ACC | AAT | CTT | ACC | ATG | GAC | ACT | 810 |
| Gln | Pro | Leu | Leu | Ala | Val | Gln | Phe | Thr | Asn | Leu | Thr | Met | Asp | Thr | |
| | | | | 260 | | | | | 265 | | | | | 270 | |
| GAA | ATT | CGC | ATA | GAG | TGT | AAG | GCG | TAC | GGT | GAG | AAC | ATT | GGG | TAC | 855 |
| Glu | Ile | Arg | Ile | Glu | Cys | Lys | Ala | Tyr | Gly | Glu | Asn | Ile | Gly | Tyr | |
| | | | | 275 | | | | | 280 | | | | | 285 | |
| AGT | GAG | AAA | GAC | CGT | TTT | CAG | GGA | CGT | TTT | GAT | GTA | AAA | ATT | GAA | 900 |
| Ser | Glu | Lys | Asp | Arg | Phe | Gln | Gly | Arg | Phe | Asp | Val | Lys | Ile | Glu | |
| | | | | 290 | | | | | 295 | | | | | 300 | |
| GTT | AAG | AGC | | | | | | | | | | | | | |
| Val | Lys | Ser | | | | | | | | | | | | | |

(2) INFORMATION FOR SEQ ID NO:8:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH:303 amino acids
- (B) TYPE: amino acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: unknown

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:8:

| | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|--|
| Met | Ala | Arg | Gly | Lys | Ala | Lys | Glu | Glu | Gly | Ser | Trp | Lys | Lys | Phe | |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | |
| Ile | Trp | Asn | Ser | Glu | Lys | Lys | Glu | Phe | Leu | Gly | Arg | Thr | Gly | Gly | |
| | | | | 20 | | | | | 25 | | | | | 30 | |
| Ser | Trp | Phe | Lys | Ile | Leu | Leu | Phe | Tyr | Val | Ile | Phe | Tyr | Gly | Cys | |
| | | | | 35 | | | | | 40 | | | | | 45 | |
| Leu | Ala | Gly | Ile | Phe | Ile | Gly | Thr | Ile | Gln | Val | Met | Leu | Leu | Thr | |
| | | | | 50 | | | | | 55 | | | | | 60 | |
| Ile | Ser | Glu | Phe | Lys | Pro | Thr | Tyr | Gln | Asp | Arg | Val | Ala | Pro | Pro | |
| | | | | 65 | | | | | 70 | | | | | 75 | |
| Gly | Leu | Thr | Gln | Ile | Pro | Gln | Ile | Gln | Lys | Thr | Glu | Ile | Ser | Phe | |
| | | | | 80 | | | | | 85 | | | | | 90 | |
| Arg | Pro | Asn | Asp | Pro | Lys | Ser | Tyr | Glu | Ala | Tyr | Val | Leu | Asn | Ile | |
| | | | | 95 | | | | | 100 | | | | | 105 | |
| Val | Arg | Phe | Leu | Glu | Lys | Tyr | Lys | Asp | Ser | Ala | Gln | Arg | Asp | Asp | |
| | | | | 110 | | | | | 115 | | | | | 120 | |
| Met | Ile | Phe | Glu | Asp | Cys | Gly | Asp | Val | Pro | Ser | Glu | Pro | Lys | Glu | |
| | | | | 125 | | | | | 130 | | | | | 135 | |
| Arg | Gly | Asp | Phe | Asn | His | Glu | Arg | Gly | Glu | Arg | Lys | Val | Cys | Arg | |

| | | | | | |
|-----------------|---------------------|---------------------|---------------------|-----|-----|
| | 140 | | 145 | | 150 |
| Phy. Lys | Leu Glu Trp | Leu Gly Asn Cys | Ser Gly Leu Asn Asp | Glu | |
| | 155 | | 160 | | 165 |
| Thr Tyr Gly Tyr | Lys Glu Gly Lys | Pro Cys Ile Ile Ile | Lys Leu | | |
| | 170 | | 175 | | 180 |
| Asn Arg Val Leu | Gly Phe Lys Pro Lys | Pro Pro Lys Asn Glu | Ser | | |
| | 185 | | 190 | | 195 |
| Leu Glu Thr Tyr | Pro Val Met Lys Tyr | Asn Pro Asn Val Leu | Pro | | |
| | 200 | | 205 | | 210 |
| Val Gln Cys Thr | Gly Lys Arg Asp Glu | Asp Lys Asp Lys Val | Gly | | |
| | 215 | | 220 | | 225 |
| Asn Val Glu Tyr | Phe Gly Leu Gly Asn | Ser Pro Gly Phe Pro | Leu | | |
| | 230 | | 235 | | 240 |
| Gln Tyr Tyr Pro | Tyr Tyr Gly Lys Leu | Leu Gln Pro Lys Tyr | Leu | | |
| | 245 | | 250 | | 255 |
| Gln Pro Leu Leu | Ala Val Gln Phe Thr | Asn Leu Thr Met Asp | Thr | | |
| | 260 | | 265 | | 270 |
| Glu Ile Arg Ile | Glu Cys Lys Ala Tyr | Gly Glu Asn Ile Gly | Tyr | | |
| | 275 | | 280 | | 285 |
| Ser Glu Lys Asp | Arg Phe Gln Gly Arg | Phe Asp Val Lys Ile | Glu | | |
| | 290 | | 295 | | 300 |
| Val Lys Ser | | | | | |

(2) INFORMATION FOR SEQ ID NO:9:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 24 bases
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:9:

ATGGGGAAGG GGGTTGGACG TGAT 24

(2) INFORMATION FOR SEQ ID NO:10:

(i) SEQUENCE CHARACTERISTICS:

- (A) LENGTH: 24 bases
- (B) TYPE: nucleic acid
- (C) STRANDEDNESS: single
- (D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:10:

ATAGTAGGTT TCCTTCTCCA CCCA 24

(2) INFORMATION FOR SEQ ID NO:11:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 24 bases

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:11:

ATGGCCCGCG GGAAAGCCAA GGAG 24

(2) INFORMATION FOR SEQ ID NO:12:

(i) SEQUENCE CHARACTERISTICS:

(A) LENGTH: 24 bases

(B) TYPE: nucleic acid

(C) STRANDEDNESS: single

(D) TOPOLOGY: linear

(xi) SEQUENCE DESCRIPTION: SEQ ID NO:12:

GCTCTTAAC TCAATTTTTC CATC 24